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The AUTOMOBILE

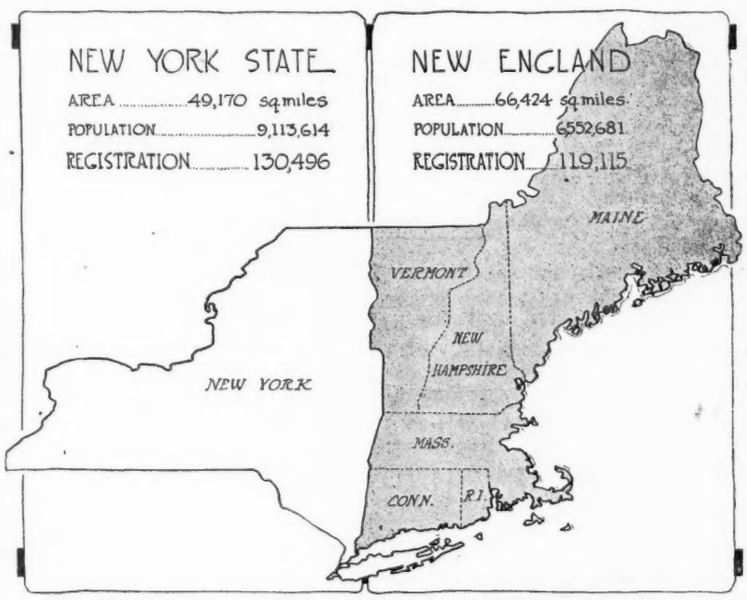
Industry Gains 25% in New England

119,115 Cars and Trucks Registered in That Section—Accessory Plants Show Progress—Many New Dealers—$200,000,000 Invested

By James T. Sullivan

BOSTON, March 2.—At the present time there are 119,115 automobiles and motor trucks in New England, or one car to every fifty-five inhabitants, computing the population at 6,552,681. More than 50 per cent. of these people live in Massachusetts. The New England registration represents about one-tenth of the total number of cars and trucks in the United States. During the past year—and some people said it was not a strong financial one—24,681 more cars were registered in this section of the country, or a gain of nearly 25 per cent.

It is interesting to consider that the population of New York City alone is over 5,200,000, or about five-sixths as great as the entire population of New England. In area, New England has but 66,424 square miles, while New York State alone has 49,170, or nearly as much. When it is realized that there are nineteen States in the Union, each of which is larger than all New England, the fact that the six little northeastern States have absorbed so many cars indicates their wealth in a very conclusive manner.



One-tenth of the automobile and motor truck registration of the United States is represented by New England. The illustration is a graphic comparison of these six states with the adjacent state of New York

In the early days of the industry New England was a leader among the manufacturers of this product, more particularly of the electric vehicles, which at that time seemed to be destined to have the call. With the great demand for ore, and the proximity of the lake cities to the ore sections, the cost of transportation of this product had much to do with shaping the destiny of the motor manufacturers to the Middle West. It was an easy matter to get ores by water at low cost, and so New England fell behind in production of cars. Right here it might be well to state that while this was happening her plants for making tools for the motor makers grew apace.

But if the Middle West has been producing, New England has been buying, and so today it ranks as one of the leading sections of the country in the number of cars owned in comparison to size and population. As a matter of fact it is doubtful if there is any other area with a similar population, unless New York be excepted, that compares to it in regard to the motor industry.

The registration figures will show how the industry fared from a selling point of view. In Maine there were 7,743 cars registered in 1912. Up to December 31, 1913, there had been 10,570 cars of all types listed, a gain of 2,827.

New Hampshire's fiscal year ends in September. At the end of 1912 the registration showed 5,764, and December 31 of last year showed 1,672 more cars, or a total of 7,436.

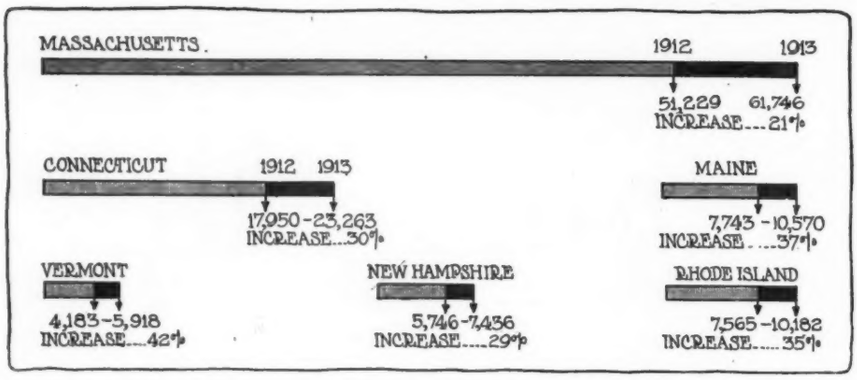


Chart showing the percentages of increase in registration made by the New England states in 1913 over the 1912 figures

Vermont showed a gain of 1,753 over its 4,183 of 1912, and the latest figures were 5,918.

Massachusetts had a gain of 10,517, or nearly as much as all the other five states together, so its 51,229 of 1912 was jumped to 61,746 for 1913.

Rhode Island had 7,565 in 1912 and 10,182 last year, a gain of 2,617, and Connecticut gained 5,313 over 1912, its 1913 figures standing 23,263.

Another interesting point is to note the gain in relation to population. In 1912 Maine, with its population of 742,371, had one car for every eighty-six inhabitants. Last year it was one in seventy.

New Hampshire, with 430,572, showed one machine for every seventy-five in 1912 and one for every fifty-eight in 1913, a gain of seventeen.

Vermont, with 355,956, had a machine for each group of eighty-five in 1912 and one for each sixty last year, reducing its number by twenty-five.

Massachusetts has 3,366,416 residents, and two years ago had one car for every sixty-six, and for last year one for every fifty-four, a drop of twelve.

Rhode Island dropped from one in seventy-two to one in fifty-three, a gain of nineteen for its 542,610 people.

Connecticut showed a big gain from one to sixty-two in 1912 to one in forty-eight, a drop of fourteen, for its 1,114,756 residents.

One Car for Every 55 People

By population for the entire six states the average was one car for every sixty-nine residents on the basis of the 1912 registration, while now it is one for every fifty-five, or a drop of fourteen, which is a very good record for one year.

That the industry has been a profitable one for the state treasuries is shown by the receipts. The writer was able to secure figures for the past 5 years from Massachusetts, Rhode Island and Connecticut on registrations and receipts, but letters to the three other states were unanswered for some unexplained reason. However, the states that responded have approximately 75 per cent. of the population and cars, and so they give a very good estimate of the totals. The car figures were given above, and so the sums received in 5 years by the three lower states totaled just $3,042,620.20. Of this amount Massachusetts received by far the larger portion, her revenue for the 5 years being $1,903,560.50. Connecticut was second with $750,083.93, and Rhode Island gathered in $388,975.77. As Maine, New Hampshire and Vermont were not basing registrations according to horsepower throughout all the past 5 years, their totals were smaller than the other states. But, allowing for the three states about $500,000, the grand total for New England would pass the $3,500,000 mark, a very good sum in revenue. If the taxes that the owners paid on the machines were computed at an average of $10 a car it would not be putting the figure too high to say that more than $1,500,000 more was added to the wealth of the states, giving at least $1,000,000 a year in these 5 years.

Distribution According to Horsepower

Some idea of how the cars are distributed according to horsepower may be gleaned from the figures in Massachusetts. As the Bay State has more than 50 per cent. of the total in New England, her figures serve as a common basis. Last year, of the 61,746 machines registered as motor vehicles of all types, 12,731, or about 20 per cent. were of 20 horsepower and under. The popular cars were the 20 to 30 horsepower, for nearly 50 per cent. were of this rating, the figures showing 29,390. About 14 per cent. were of 30 to 40, there being 9,145 cars of that power. The 40 to 50 had 4,832 cars, and those more than 50 horsepower had 620. This gives a total of 56,718 passenger cars, the 5,948 trucks being deducted. The 915 over the total registration figures represents the non-residents registered. There were 60,733 gasoline and 1,013 electric vehicles, a percentage of 1.6 for electrics to 98.4 gasoline.

Another division shows, of the 1,013 electrics, 604 were passenger cars, and there were 409 electric trucks. So the final tabulation gives: passenger cars, gasoline, 56,713; electrics, 604; trucks, gasoline 5,539, electric 409. When the Highway Commission made its last traffic census it showed that 59 per cent. of the traffic on the Bay State roads was motor cars. This percentage has probably increased now to at least 65 per cent. with the increase of the trucks. This is a gain of nearly 100 per cent. in 4 years.

Data From City Officials

To get some idea of the distribution of cars the writer requested information from some of the Bay State cities. Officials were asked as to the number of vehicles taxed by them. A number of the cities class the motor vehicles with general property, and it was not possible to get details. Other cities, however, had separate accounts, and these give a good idea of conditions.

Boston naturally has the greater part of all the machines, but it was not possible to get data from the city officials there.

Chelsea, Newton and Medford, three cities that touch Boston on the north and west, gave figures that may be a good average

CAR REGISTRATIONS IN THE SIX NEW ENGLAND STATES FOR 1914.

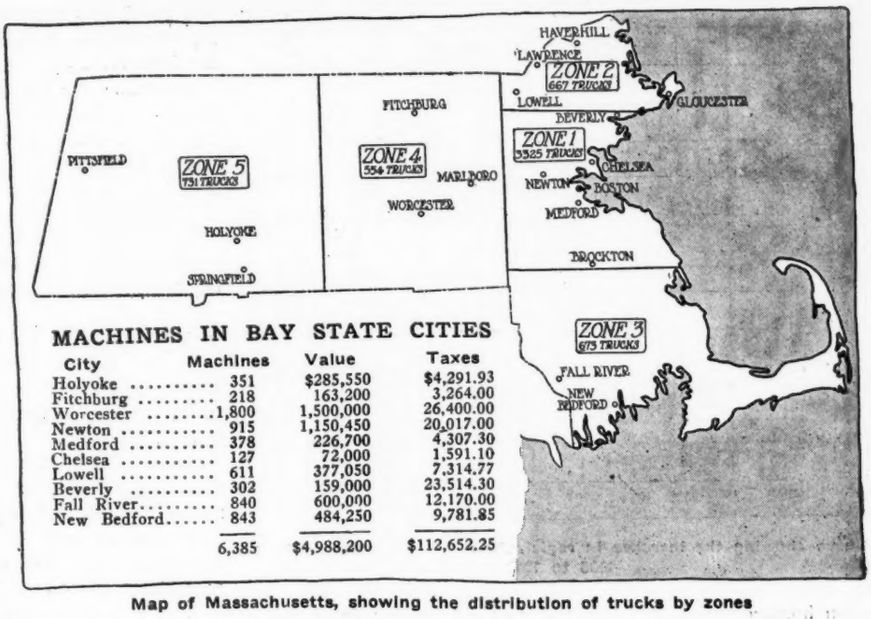
State	Cars Reg. 1913	New Reg. 1913	Cars Reg. 1912	Per Cent. Increase	Gasoline Passenger	Gasoline Trucks	Electric Passenger	Electric Trucks	Non-Res. Reg.
Connecticut	23,263	5,313	17,950	29.5	20,000	2059	351	141	.....
Maine	10,570	2,827	7,743	36.8	10,193	365	8	4	.....
Massachusetts	61,746	10,517	51,229	20.6	56,713	5539	604	409	920
New Hampshire*	7,436	1,672	5,764	29.2	6,770	401	35	17	16
Rhode Island	10,182	2,617	7,565	34.6	9,057	1071	34	20	288
Vermont	5,918	1,735	4,183	41.5	5,763	146	7	2	448
Totals	119,115	24,681	94,434	Av. 32	108,496	9581	1039	593	672

*New Hampshire has 222 steam passenger cars and seven steam trucks.

for cities outside the big capital. Newton showed 915 motor vehicles registered at a value of $1,150,450, on which $20,017 was collected in taxes. Medford had 378, valued at $226,700, for which it received $4.307.30, and Chelsea had 127 vehicles, valued at $72,000, taxed for $1,591.10.

The northeastern section of the state is represented by Beverly and Lowell, two cities typical of manufacturing. Beverly had 302 machines rated at $159,000, on which $23,514.30 was collected, and Lowell, with its 611 vehicles valued at $377,050, got $7,314.77.

The Southern Cape section also put in figures alike typical of the district. Fall River, with 840 machines valued at $600,000, got $12,170 in taxes, and its neighbor, New Bedford, with 843 rated at $484,250, collected $9,781.85. The mid-section of the state was also heard from. Worcester has 1,800 machines, rated at $1,500,000, on which it collected $26,400. Fitchburg, just above it, had 1,913 machines, rated at $163,200, on which $3,264 was collected. Holyoke, just above Springfield, reported 351 machines, valued at $258,550 and taxes on them rated at $4,291.93. This gives a total for the ten cities of 6,385 machines, with a valuation of $4,988,200, on which taxes aggregating $112,652.25 were paid in the year just passed.



MACHINES IN BAY STATE CITIES

City	Machines	Value	Taxes
Holyoke	351	$285,550	$4,291.93
Fitchburg	218	163,200	3,264.00
Worcester	1,800	1,500,000	26,400.00
Newton	915	1,150,450	20,017.00
Medford	378	226,700	4,307.30
Chelsea	127	72,000	1,591.10
Lowell	611	377,050	7,314.77
Beverly	302	159,000	23,514.30
Fall River	840	600,000	12,170.00
New Bedford	843	484,250	9,781.85
	6,385	$4,988,200	$112,652.25

Map of Massachusetts, showing the distribution of trucks by zones

Records of Trucks Incomplete

The growth of commercial vehicles in New England presents an interesting study as far as the figures are available. On this subject some of the states have not kept records. Vermont and Connecticut do not record trucks on a separate basis, and so they are all classed with the passenger cars. The other four states now make separate accounts, and it is possible to get reliable data. There are approximately 10,500 motor trucks in New England at the present time, of which 595 are of the electric type. This includes machines used for business purposes that formerly had been sold as passenger cars. This number does not include the great mass of machines used for both business and pleasure.

Maine registered last year 358 trucks, a gain of eighty-three over 1912, when 275 were registered. New Hampshire had 651 on its rolls for 1913, but did not keep a separate list before that time. Rhode Island had about 1,600 last year and about 1,275 the preceding year. Connecticut has nearly 2,000 and Vermont a few hundred.

Massachusetts the Big Truck State

Massachusetts is the big truck state. With good highways in all directions and a large manufacturing group of cities and towns in its eastern section, it is not surprising that it is a good field. Last year there were registered 5,948 trucks, of which 409 were electric. In the previous year the registration was some 4,108 trucks, with 262 of them electrics. The percentage last year was ninety-three gasoline and seven electric. The distribution and tonnage of the Bay State vehicles make an interesting comparison.

To get at the figures the registration list of 1913 was gone over and about 75 per cent. of the machines tabulated to get an estimate. The state was first divided into zones. Zone 1 comprised what is called Metropolitan Boston, embracing the capital and the cities and towns for a radius of about 20 miles. In this zone it was found that there were approximately 3,325 trucks registered, or about 55 per cent. of the total.

Zone 2 comprises all the section to the north and east above the Salem-Beverly section. That is the mill part of the state, with such cities as Lowell, Lawrence, Haverhill, Gloucester and Newburyport. In this zone were located 667 machines, or about 11 per cent.

Zone 3 was the other part of the state to the south of Boston, embracing the Cape Cod section from Brockton on. In this section were included such cities as New Bedford, Fall River, Taunton and a number of towns, and also the Rhode Island trucks bearing Massachusetts registration as required under the 10-days-a-year law. This zone showed a good balance with the other, for it, too, has about 11 per cent., or 673 trucks.

For Zone 4, that section of the state centering about Worcester, was chosen. It included Marlboro, Fitchburg, Leominster and some other well-known sections. The figures showed about 9 per cent. of the total or some 554 trucks.

Zone 5 included all that section of the state west of Springfield, including that city. Holyoke, Pittsfield, Lenox, North Adams, Chicopee and Northampton come under this zone. It showed 731 commercial vehicles, or about 12 per cent. This is a very good geographical distribution that gives evidence of the growth of the machines throughout Massachusetts.

Difficult to Solve Tonnage Problem

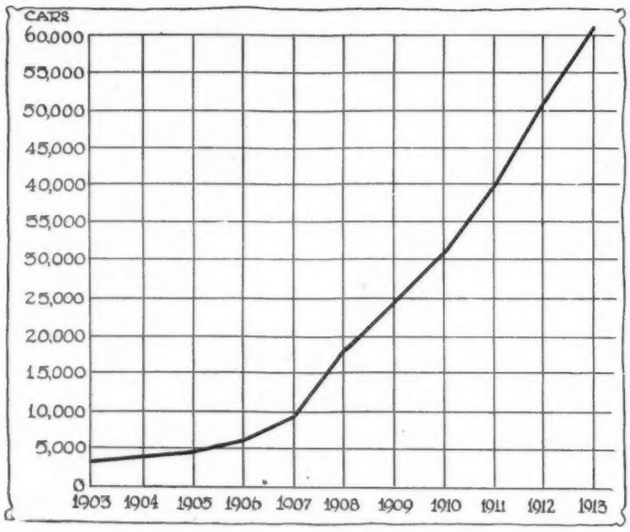
The tonnage was a difficult problem to solve. The Highway Commission rates all trucks under the law at $5, not basing them

INCREASE IN FIRMS IN CITIES IN NEW ENGLAND

State	Cities and Towns 1912	1913	Gain	Dealers 1912	1913	Gain
Maine	104	122	18	294	377	83
New Hampshire	74	92	18	206	244	38
Vermont	57	64	7	142	154	12
Massachusetts	248	268	20	1347	1591	244
Rhode Island	24	29	5	249	353	104
Connecticut	80	80	0	473	484	11
Totals	587	655	68	2611	3203	592

CAR PER CAPITA FIGURES—1912-1913.

State	Population	1912	1913
Maine	742,371	1 in 86	1 in 70
New Hampshire	430,572	1 in 75	1 in 58
Vermont	355,956	1 in 85	1 in 60
Massachusetts	3,366,416	1 in 66	1 in 54
Rhode Island	542,610	1 in 72	1 in 53
Connecticut	1,114,756	1 in 62	1 in 48



Curve showing the increase in registration in Massachusetts from 1903 to 1913

upon horsepower, or tonnage, and so the basis for determining them was to figure on the capacity as given in the makers' ratings. For example all Ford cars, though carrying 800 to 1,000 pounds, are rated as 1 ton. Other cars formerly used for pleasure purposes that have good power in the vicinity of 40 are classed as 2-ton. It was found that about 52 per cent. of the trucks, or some 3,065, were of 1 ton or less. For 2 tons there were 944, or about 16 per cent. The 3-ton class had 1,065, or about 18 per cent, and the 5-ton, embracing trucks from 4 tons up and more than 5 tons, showed 826, or about 14 per cent. Of the total number of machines registered, 7 per cent. were electric, being 409, and 93 per cent. gasoline. Of the total, 5,950 trucks, approximately 28 per cent., had pneumatic tires, or about 1,650 of them, showing that all the trucks do not tear up the roads. The last census showed that motor trucks were only about 4 per cent. of the traffic on the highways, so that hundreds of the vehicles are used solely in the large cities.

Big Increase in Dealers

Another interesting sidelight on the motor industry is shown by the figures of the firms that are now engaged in it in one capacity or another. In 1912 there were 2,611 firms listed in 587 cities and towns of New England engaged in this work. Last year the figures showed an increase in both. The cities and towns represented had jumped sixty-eight, making a total of 655, while the firms crept up to 3,203, or a gain of 581.

In Maine the figures were 104 cities and towns, with 294 dealers in 1912, and 122 towns, a gain of eighteen, and 377 dealers, an increase of sixty-three in 1913.

New Hampshire's figures were seventy-four cities and towns, 206 dealers, in 1912; ninety-two towns and 244 dealers, an increase respectively of eighteen and thirty-eight for 1913.

Vermont in 1912 had fifty-seven cities and towns, with 142 dealers, and in 1913 had sixty-four towns, a gain of seven, and 154 dealers, a gain of twelve.

Massachusetts in the Lead

Massachusetts, as usual, showed the biggest figures, with 1,347 dealers in 248 cities and towns in 1912, and 1,591, or 244 more firms, and 268, or twenty additional cities and towns represented in 1913.

Rhode Island had 249 firms in twenty-four cities and towns in 1912, and last year had 104 more dealers, or a total of 353, with five more cities, bringing the figures to twenty-nine.

In Connecticut the cities and towns remained the same, just eighty for the 2 years, while the firms increased from 473 in 1912 to 484, a gain of eleven in 1913.

Some of the leading cities where increases were noted were Bangor and Portland in Maine; Manchester and Portsmouth in New Hampshire; Boston, Cambridge, Fall River, Lowell, Springfield and Worcester in Massachusetts, and Providence, Newport and Pawtucket in Rhode Island. In Vermont and Connecticut there were no increases in the big cities.

Capitalization Increased $1,000,000

Another sidelight on the industry is shown also by figures from the Massachusetts Bureau of Statistics for 1912, the last compilation made, and the figures of previous census reports. These figures show a decrease in the manufacturing end of the motor industry. In 1909 the high point was reached with sixty-two

ELECTRIC FIGURES FOR NEW ENGLAND.

	Passenger	Commercial	Total
Maine	8	4	12
New Hampshire	35	17	52
Vermont	8	3	11
Massachusetts	604	409	1013
Rhode Island	34	20	54
Connecticut	351	141	492
Totals	1040	594	1634

MASSACHUSETTS COMPARISON 1912-1913.

December 31, 1913	604	409	1013
December 31, 1912	487	262	749
Increase	117	147	264
Per cent. increase	24	56.1	35.2

COMPARISON OF TRUCK FIGURES.

	1912	1913	Increase	1913 Gasoline	1913 Electric
Maine	275	358	83	350	8
New Hampshire	*	651	*	633	18
Massachusetts	4108	5950	1842	5541	409
Rhode Island	1275	1600	325	1580	20
	5658	8559	1901	8104	455

*Not kept separate.
Vermont and Connecticut make no distinction between trucks and cars.

CARS BY HORSEPOWER IN MASSACHUSETTS IN 1913.

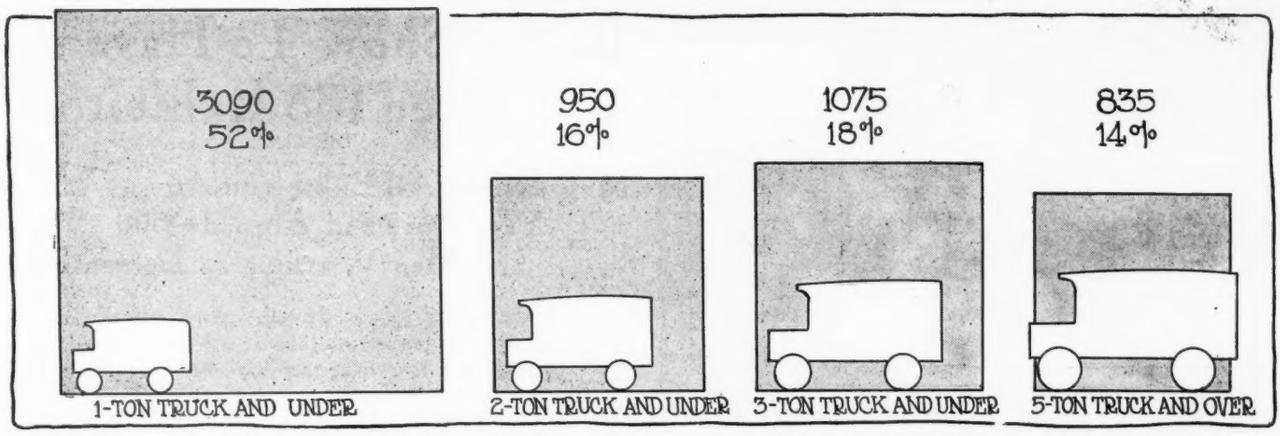
20 H.P. and under	12,731	
20 to 30	29,390	
30 to 40	9,145	
40 to 50	4,832	
50 and over	620	
Total	56,718	
Gasoline	56,114	98.4 per cent.
Electric	604	1.6 per cent.

TRUCKS BY TONNAGE IN MASSACHUSETTS IN 1913.

1 ton and under	3090	52 per cent.
2 ton	950	16 per cent.
3 ton	1075	18 per cent.
5 ton and over	833	14 per cent.
	5948	
Gasoline	5539	93 per cent.
Electric	409	7 per cent.

BUSINESS FIRM INCREASE IN PRINCIPAL CITIES.

	1912	1913
Maine		
Bangor	15	17
Portland	43	45
New Hampshire		
Manchester	17	17
Portsmouth	10	12
Massachusetts		
Boston	268	326
Springfield	78	93
Worcester	70	82
Cambridge	34	49
Lowell	22	38
Fall River	20	28
Rhode Island		
Providence	159	206
Newport	24	39
Pawtucket	17	23



Classification of the trucks in Massachusetts by capacities. The areas of the shaded squares indicate the relative number of trucks, from 1 to 5 tuns

establishments, 4,138 employees and a finished product of $11,359,000. The value added by manufacture was $5,868,000. On the other hand, while the establishments and product decreased, together with the wage earners, yet the capitalization had increased in 1912 by more than $1,000,000. In 1909 the capitalization was $7,458,000, and in 1912 it had run up to $8,890,899. Moreover, while the employees in 1912 were not as many, they got better wages, for while the 4,138 employed in 1909 received $2,793,000, the 3,654 working in 1912 were paid $2,825,495. The figures for 10 years ago, going back to 1904, when compared to the 1912 figures, show a gain approximately of something like 200 per cent.

Lamp Making Shows Progress

It is interesting also to compare the lamp making in 1904 and 1912, now that it is so closely allied with the motor industry. In 1904 there were fourteen plants, with 192 employees, getting $118,968, working on a capitalization of $208,480, the value of the product being $399,967. In 1912 the capitalization jumped to $547,000, the employees numbered 406, there were but five plants, the wages reached $257,992, and the total value of the product reached $639,599. In other words, while nine concerns went out of business or were merged with others, bringing the number down to five, the value increased more than 100 per cent. all along the line.

Electric Vehicles Come to the Front

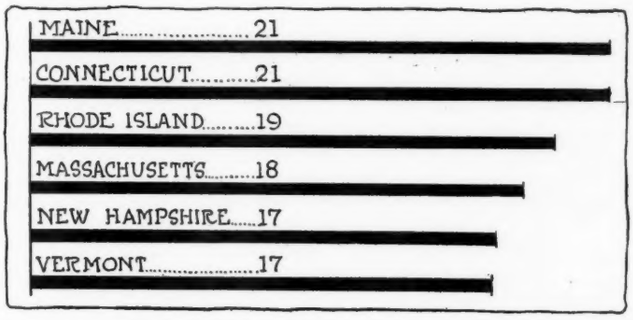
The progress made by the electric vehicles is well worth considering. Due to the energy of the Electric Vehicle Assn. of America and its various sections much has been accomplished within the past 2 years. Before that the marketing of electric cars was not done consistently as a body. Now the Electric Motor Car Club of Boston has its outings, shows and conventions at regular periods, and luncheons every month, at which the electric vehicles are discussed. A new plan, that of going out into other cities and towns, giving demonstrations as a body, has been inaugurated with much success.

1,630 Electrics in New England

The electric figures show that there is now in New England, as near as can be estimated, 1,630 electric machines, of which 1,035 are pleasure cars and 595 are trucks. Massachusetts leads with a total of 1,013, with Connecticut second, having 492. Rhode Island has fifty-four, New Hampshire forty-eight, while Maine has but twelve and Vermont eleven. The activity of the electric men is apparent in comparative figures for Massachusetts during the past 2 years. While there are 1,013 registered now, there were but 749 on the lists in 1912. There has been an increase of 117 pleasure cars, or 24 per cent., and an increase of 147 trucks, or 56.1 per cent. This gives an average increase of 35.2 per cent. for 1913 over 1912. On this basis there are 119,060 gasoline and 1,630 electric vehicles in New England.

Industry's Investment $200,000,000

Summed up in recapitulation, it is not an exaggeration to state that the motor industry now in New England represents at least $200,000,000 and gives employment to an army of about 100,000. The larger part of this is in the Bay State, of course. If the 120,000 machines are rated at $500 each it gives $60,000,000. Officials of the Massachusetts Garage Assn. state that the value of the business they represent is close to $100,000,000. Certainly the money invested in dealers, makers, lamp, tire, body and the miscellaneous business is enough to make it a total of $200,000,000. The real estate in Boston alone used for motor purposes runs



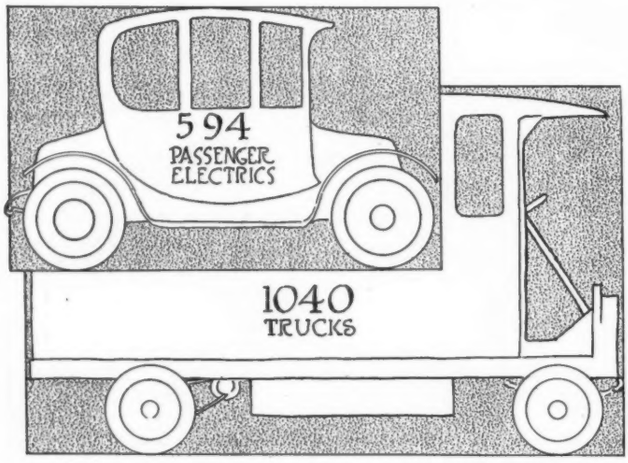
Graphical representation of the number of cars per thousand inhabitants in the various New England states

GROWTH OF INDUSTRY IN MASSACHUSETTS.

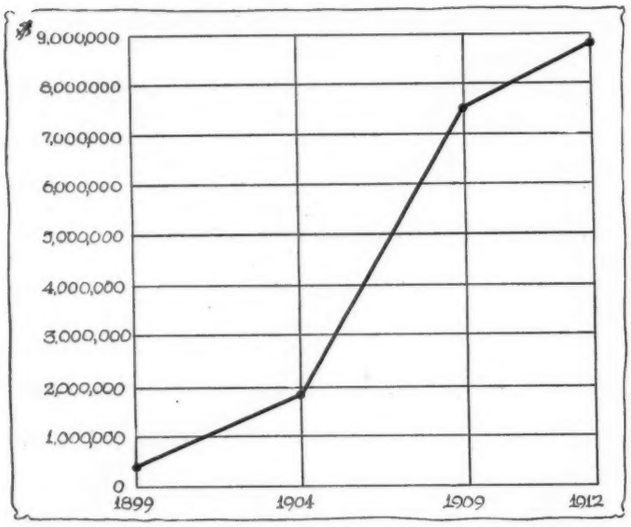
Year	Cars	Fees
1903	3,743	$17,684.00
1904	4,261	19,162.00
1905	4,889	24,490.50
1906	6,572	33,085.50
1907	9,555	92,091.50
1908	18,052	121,488.50
1909	23,971	169,973.54
1910	31,360	403,300.72
1911	39,907	504,162.45
1912	51,229	616,245.94
1913	61,746	764,153.51
Total		$2,755,838.16

INCREASE IN DEALERS, CHAUFFEURS, ETC., IN PAST 5 YEARS.

Year	Dealers	Private Operator	Chauffeur
1909	491	8,336	3,289
1910	649	9,450	3,775
1911	870	11,061	4,183
1912	1114	14,693	5,570
1913	1330	17,009	5,233
Totals	4454	60,549	22,050



Ratio of electric trucks to passenger electrics in New England



Capital invested in Massachusetts automobile factories since 1899

high into the millions. The factories employ 3,600; there are perhaps 38,000 chauffeurs in New England; averaging ten employees to each of the 3,200 firms in business gives 32,000 more, and certainly there are 3,400 in the accessory plants, giving the 100,000 total. These figures will set the business man thinking that New England stands well in the automobile industry.

Boston Show To Have Over 138 Exhibitors

May Eclipse All Exhibitions of Year Here and Abroad—500 Men Working on Decorations

BOSTON, MASS., March 4—An army of workers numbering about 500, took possession of Mechanic's building on Monday and ever since they have been hustling to get the big structure into shape for the annual automobile show that opens on Monday night. According to the figures now prepared the Boston show will eclipse all others here and abroad in the number of makes represented. Figures compiled for Manager Chester I. Campbell show that Boston in 1910 secured the International record with 122 makes of cars and 650 complete cars and chassis exhibited.

This year the figures show that the exhibitions at the different cities here and abroad had makes as follows:

Paris	London	New York	Chicago	Boston
*132	*126	79**	86**	138***

*Including trucks.
**Passenger cars only.
***Cars and trucks; may be increased.

Some idea of the Boston show as it has grown in the past few years are given in the following figures:

Year	Passenger	Truck	Total	Attendance
1908	77	7	84	69,000
1909	88	18	106	92,000
1910	97	25	122	107,600
1911	102	41	143	146,400
1912	107	66	173	225,000
1913	108	68	176	245,000

This year Boston has eighty-eight makes of pleasure cars scheduled for its opening, and there may be a few more jammed in somewhere before Saturday night. However, even with eighty-eight that leads New York and Chicago in the number of pleasure cars. Following the week of passenger cars there will be a display of trucks, this exhibition starting on Tuesday evening and continuing until Saturday night.

Fine Decorative Effects

Boston will have some fine decorative effects this year. The plans call for an illumination of the exterior of the building on a scale never before attempted. Eight large electric signs will form the apex of a series of lights which extend below the cornice for the entire length of the building. For the first time

MANUFACTURING STATISTICS FOR MASSACHUSETTS.

	Year	Number of Plants	Capital Invested	Stock and Materials	Value of Product	Value Added by Manufacturing	Average Number Wage Earners	Wages Paid
Cars, including bodies and parts	1899	12	$476,000	$ 307,000	$769,000	$462,000	303	$188,000
	1904	18	1,939,000	1,268,000	2,663,000	1,395,000	1100	709,000
	1909	62	7,458,000	5,491,000	11,359,000	5,868,000	4138	2,793,000
	1912	57	8,890,899	4,130,059	9,649,259	5,519,200	3654	2,825,495
Lamps:								
Reflectors	1904	14	208,480	97,289	399,967	302,678	192	118,968
	1912	5	547,000	352,047	991,646	639,599	406	257,992

FINANCIAL GAIN FOR THREE NEW ENGLAND STATES IN 5 YEARS.

	MASSACHUSETTS		RHODE ISLAND		CONNECTICUT	
Year	Cars	Fees	Cars	Fees	Cars	Fees
1909	23,971	$119,855.00	4,609	$43,557.00	8,000	$58,534.00
1910	31,360	296,330.00	5,911	59,948.23	9,702	105,246.70
1911	38,907	380,760.00	7,262	74,265.54	14,089	171,539.86
1912	51,229	492,482.50	7,565	96,171.00	17,950	181,584.97
1913	61,746	616,133.00	10,182	115,034.00	23,263	233,179.40
	....	$1,903,560.50	....	$388,975.77	....	$750,083.93

Grand total, $3,042,620.20.
Figures for other three states not available.

in the history of motor shows in Boston the big tower of the structure will be illuminated with lights that may be seen for blocks.

The general motive of the decorative scheme this year is planned along Italian lines. Ernest W. Campbell, who designed the plans, spent some months in Europe looking for something new and he found it. The machinery hall is to present a Roman scene. Marble panels will be erected on either side of the entrance lobby, and elliptical arches reached from fluted pilasters spanning the corridor. White statues will stand out in bold relief against a dark background of foliage.

One big Roman arch is to be located at the entrance to the hall. All the beam work is to be hidden by handsomely painted tablets, while carved decorations conceal other supports. Massive columns of antique bronze will stand out prominently, each of which will be surmounted by large illuminated glass globes with the names of the exhibitors painted on them. Thousands of electric lights will be strewn through the building. The side walls are to have the marble cornice effect, with paintings reproducing scenes in Italy, and Italian traceries will be used above the windows. The stairways going to the second floor will be hidden by electric lights of an original design surrounded with foliage, while a canopy effect will add to the deception.

A Venetian Touch

Grand hall will be decorated after Venetian plans. A proscenium arch curtain 140 feet long and 45 feet high will be reared above the stage where its carved mosaic effects will stand out strikingly. A perspective view of Venice 90 feet long and 30 feet wide will be seen in the background and the banners of the famous rulers will have conspicuous places there and along the balcony where also will be reproduced the crests of Roman and other rulers of bygone centuries. The entire ceiling will be covered with a massive canopy pierced to represent open carved work, from which will hang as pendants eight electroliers each composed of twelve Venetian wrought iron illuminated lanterns. Garlands of bright flowers will be festooned far beneath each lamp, while many streams of light will stretch across the hall in all directions. Arches will be found in this hall also reaching from floor to the ceiling under the balcony. These arches are studies adapted from the Duke's palace in Venice. Decorative effects representative of scenes along the Grand Canal will border the walls.

A View of the Grand Canal

Opposite the stage will be the real big feature of the show in decorative effects. This will be a view of the Grand Canal of Venice 150 feet long and 40 feet high. The view of this from the stage through the mass of foliage and carvings will be beautiful. Florentine panels are built up in all the spaces so that the harmonious effect of the brilliant colors from Mediterranean shores make a splendid background for the cars.

Grand hall is divided into squares again this year, and most of the exhibitors will be makes that have been seen there year after year. There will be a number of makes occupying spaces in machinery hall that have been in the same locations also for years. Most of the new exhibitors will be in the basement or sandwiched in between the older ones. Some of them will be in spaces among the older concerns who have taken on additional cars as a side line.

Six European Drivers Entered for 500-Mile Race

PARIS, Feb. 17—Georges Boillot, twice winner of the French Grand Prix; Jules Goux, winner in 1913 at Indianapolis; Albert Guyot with the 120 horsepower Delage holding the world's long distance road record; Joseph Christiaens, the crack Belgian race driver, and holder of Brooklands records; Jean Chassagne with the six-cylinder Sunbeam, having covered more than 1,078 miles in 12 hours on Brooklands track; Arthur Duray with the 183 cubic inch Peugeot having shown nearly 96 miles an hour on the level—these six will constitute the European team to cross the Atlantic next May in the hope of securing a share of the $50,000 cash prizes offered in connection with the Indianapolis 500-mile race. According to the Paris representative of the Indianapolis Motor Speedway, all these men have put in their official entry with the exception of Arthur Duray, who will sign as soon as certain formalities have been complied with.

Georges Boillot, the European speed king, and Jules Goux, winner of last year's Indianapolis race, who have handed in their formal entry for the 1914 classic to the Paris representative of the Indianapolis Motor Speedway, hold enviable records. Georges Boillot, head of the Peugeot racing team, has not previously visited America and has never taken part in any important track race. He has run in practically all the European road races of the past 7 years, starting on single-cylinder Lion-Peugeots, graduating to twin and four-cylinder Lion-Peugeots, and finally taking charge of big Peugeot racing cars. His success on the road has been phenomenal. In 1908 he finished fourth in the voiturette section of the French Grand Prix; in 1910 he occupied the same place in the Boulogne light car race; in 1911 he was second in the 3-liter race, less than a minute behind the winner; in 1912 he won the French Grand Prix. Last year he won every race in which he was entered: French Grand Prix at Amiens, 3-liter race at Boulogne; speed records at Boulogne; and the record for Mont Ventoux hill climb.

In addition to being a race driver, Georges Boillot is largely responsible for the design of the machines he pilots. He has done a little track work at Brooklands, but has never attempted any records on the track.

In addition to winning the Indianapolis race last year, Jules Goux finished second behind his team mate Boillot at the Amiens Grand Prix, and was second, again behind Boillot, in the 3-liter race at Boulogne. He has done a great deal of track racing and is considered by many experts to be superior to Boillot for this class of racing. In the 235 cubic inch class Goux holds the Brooklands records for half-mile, kilometer, mile flying start, also 10 laps, 50 laps and 100 laps standing start. He holds all records in the 475-cubic inch class, and in one hour covered a distance of 106 miles 387 yards, standing start.

The appearance of Boillot and Goux at Indianapolis has been made possible by reason of the advanced preparations for this year's French 275 cubic inch Grand Prix. Before they sail for America, early in May, the 1914 Peugeot racers will have been on the road and will have been thoroughly tried out. During the absence of the two men the preparation of the 1914 cars will be left in the hands of Victor Rigal, the third member of the team. Boillot and Goux will return immediately after the Indianapolis race in order to train for the French classic on July 4.

The Peugeot cars to be used at Indianapolis are those having finished first and second at the Amiens Grand Prix, at an average speed of 72.1 miles an hour. In this race the fuel consumption was restricted to 20 liters per 100 kilometers. The two racers have a four-cylinder block motor of 3.9 by 7.08 inches bore and stroke, giving a cylinder area of 341.7 cubic inches. They are thus considerably below the maximum allowed under the Indianapolis rules. There are four valves per cylinder operated by two overhead camshafts, the general arrangement being similar to that of the previous year's racers. The cars are shaft driven, with the drive taken through the underslung springs.

Guyot to Drive Delage

It is practically certain that Albert Guyot will drive a Delage in the Indianapolis race. The official entry form has not yet been signed, but assurance has been given that this will be done in a few days. It is quite possible that a second Delage will be entered, the driver to be Arthur Duray, who figured for Dietrich in some of the earlier Vanderbilt Cup contests, and who recently handled the 300-horsepower Fiat at Ostend. The Delage cars are ready and are not required for any events in Europe this year. Like the Peugeots, they are four-cylinder block models of 105 by 180 millimeters, or 4.13 by 7.08 inches. There are four valves per cylinder, mounted horizontally near the cylinder head and operated by vertical push rods and bell cranks. The cars have a Claudel carbureter and two magnetos firing simultaneously. The crankshaft is mounted on ball bearings, and ball bearings are also used for the cam and auxiliary shafts. A disk clutch is fitted, the gearbox gives four speeds and the drive is taken through the springs.

Electric Transmission Systems in Trucks

Different Gas-Electric Combinations with Their Advantages, Costs and Errors Discussed

NEW YORK, Feb. 26—At the annual meeting of the Metropolitan Section, Society of Automobile Engineers, held in the Automobile Club of America this evening the officers of 1913 were unanimously re-elected for the ensuing year. These are, Joseph A. Anglada, chairman; N. B. Pope, secretary, and Herbert Chase, treasurer.

After the election a resolution was passed amending the by-laws and providing for a nominating committee for the future. This nominating committee will be selected by a vote at large of the membership, which vote must be reported at the December meeting.

The subject of the evening was electric transmission, the field being divided among different types such as individual motors on the rear wheels or all four driving wheels and both systems in which electric units take the place of the sliding, selective or planetary gearsets now in use. No prepared papers were read, with one exception, and the discussion was general, being participated in by a dozen or more.

The prevailing opinion was that the electric transmission was suited to heavy truck and tractors but not so well adapted to trucks of under 3-ton capacity or to pleasure car work. There was one exception, however, to this and that was the Entz system as used on the Austrian Daimler. This car was seen at the New York show, the exhibit being made by R. M. Owen & Co., New York City, who has secured the Entz patent rights.

Three types of electric transmission were described, one of which was the Entz system. In this the gasoline motor drives a generator which generates current that supplies a motor. The armature of this motor being coupled to the drive shaft on one end, and to the armature shaft of the generator on the other. The field of the generator takes the place of the flywheel while the field of the motor is stationary, being bolted to the frame. In this system the power is transmitted by a magnetic clutching action, the field of the generator attracting its armature and thus producing a torque that is transmitted to the rear wheels. On intermediate speeds in addition to this magnetic clutch the drive is assisted by the motor, the current from the generator being sent through the motor.

The Entz system takes the place of clutch gearset, starting motor and electric lighting generator, and for this reason the total weight of the Austrian Daimler chassis is no more than when a mechanical drive is fitted.

In connection with this electrical system of transmission Mr. Beecroft pointed out that the performance of this car equals, in every way, the performance of a car fitted with the sliding gearset and he said that tests had shown that the economy of this car was equal to that of cars with mechanical drive.

Eliminate the Gearbox

Mr. Day suggested a system of electrical transmission in which the ordinary clutch would be retained but the change gearbox eliminated. One way of doing this would be to reduce the flywheel with the motor generator, which would supply a battery. With this system when heavy-going or steep hills were encountered, the extra torque necessary to propel the car under these conditions would be supplied by the motor which would draw on the energy previously stored in the battery. With a 30-horsepower gasoline motor a 5-horsepower, compound-wound electric motor and a 60-volt 100 ampere storage battery would be sufficient. The capacity of this battery would be large enough to propel the car 25 miles without any assistance whatever from the engine and this would be ample to meet all conditions in touring. The weight of such a system would be between 300 and 400 pounds but when it is considered that the change gearbox, self-starter and lighting generator would be eliminated, it is seen that the overall weight of the car would be but slightly increased.

Reversing would be accomplished by changing the direction of the current through the field of the motor. This would necessitate the driving of the gasoline motor in the reverse direction also, but this is not objectionable because the reverse would be used a very small part of the time.

Mr. Day suggested a similar system in which the motor generator was separate from the flywheel and in which a clutch would be placed on either side of the motor generator unit. This would eliminate the necessity of driving the engine backwards when reversing because the forward clutch could be thrown out of engagement and thus the electric motor would only drive the rear wheels.

The third system of electrical transmission that was discussed was that in which a generator was coupled to the flywheel, from which power is supplied to drive motors connected to the wheels. There are several of these systems in use, some of which are equipped with a storage battery, while others are not.

With this system from one to four motors are used for driving the wheels. When one motor is used it is generally located amidships and drives through a differential to the rear wheels. Two speeds are generally used, these being obtained by putting the fields in series for one speed and in parallel for the other.

A more common type is where two motors are employed, one for each rear wheel. In this case also there are two running notches, one of which is obtained by placing the motors in series and the other by connecting them in parallel.

Four wheel drive is sometimes used with this type of electrical transmission and in this case there is an individual motor for each wheel. A good example of this type is the Couple-Gear truck.

Compound wound generators that will give a practically constant voltage over a wide range of load are generally used with this system, and the motors are series wound.

No clutch is required because when the motor is running idle, the voltage produced by the generator is not sufficient to rotate the driving motors. In starting a machine of this type it is only necessary to speed up the gasoline motor.

Efficiencies of Electric Type

There was a great deal of discussion on the advantages and disadvantages of this type of transmission. It was maintained by some that its over-all efficiency was low and that the initial cost and weight of a chasis fitted with this type of drive was very high. Others claimed that this system was satisfactory when properly designed and it was generally admitted that it offered special advantages where trailers were used.

Mr. R. M. Lloyd stated that the success of this type of transmisson was doubtful because of the great weight of the electrical units. He said that the Fifth Avenue Bus Company had several machines in operation for years and that it was found that if the generator and the motors were large enough to take the full engine power they were too heavy and costly. On the other hand if the electrical end was brought within the weight requirements it was not capable of transmitting the full engine power. It was found in this case that the gasoline electric busses would not accelerate as rapidly as those equipped with sliding gearsets, and that this was a great objection in bus work. He also said that these busses required 25 per cent. more gasoline than the other type and that maintenance was almost as great as with the mechanical drive designs.

Mr. Wilson, who has had a great deal of experience with the Fisher electric transmission, stated that he believed that while the efficiency of this system was lower, the performance of the engine was better and also that the success of a gas-electric design depends entirely on the proportioning of the parts. He said that one of the great reasons why the Fisher system had not been more successful was due to the fact that the drivers would not give the batteries the attention they deserve. He believed that there was no need for a gas electric design on trucks of less than 3 tons capacity.

Favors Gas-Electrics

Mr. Hexter, maker of the Hexter truck, then gave his experiences with trucks of various types and explained why he was in favor of the gasoline-electric type. This truck is equipped with an electric transmission and was described in the Oct. 9, 1913, issue of THE AUTOMOBILE. He said that the most important feature in truck construction was the elimination of the human element and that he believed that there was less

likelihood of a careless driver injuring a truck of this type than one equipped with a mechanical drive. He said that while in the early days the gas electric truck was inferior to the mechanical type that this was not so now and that there were a great many gasoline electric trucks that were showing a better performance than the mechanical type now. He said that while the latter would show less gasoline consumption on a smooth level road, that under practical conditions of operation the economy of the electric type was better.

He said, also, that the gas electric was much easier on tires, the Tillings Stevens Co., of England, makers of busses, guaranteeing 14,000 miles on a set of tires. He also brought out the point that there was a great saving in lubricating material as with the electric drive oiling was necessary but once a year, while with the sliding gearbox at least 30 pounds of grease were required every month. Another point in favor of the gas-electric drive is that no brakes are required in ordinary running and therefore there is no wear and tear on these parts, braking being accomplished electrically.

Costs of Gas-Electrics

In support of his arguments that the maintenance of the gas electric truck is less he quoted the following figures for busses of different types in operation in New York, Paris and London.

City	Motive power	Type of drive	Cost per mile, cents
New York	gasoline	sliding gear	41
Paris	gasoline	sliding gear	21
London	gasoline	sliding gear	17
London	steam	mechanical	16
London	gasoline	clectrical	14

Another point brought out by Mr. Hexter was the ease of operation of the gasoline electric truck, stating that speed could be varied from 1-16 of a mile per hour to 10 miles per hour in 10 seconds.

Standardizing Tire Attachment

NEW YORK CITY, March 3—Two subcommittees of the standard committee of the Society of Automobile Engineers met this morning at headquarters in this city to discuss the question of wheels for motor trucks. This meeting was of the commercial car wheels and truck standards committees.

The matter of the carrying capacity of solid tires was taken up. At present confusion arises due to the fact that one tire maker publishes a table giving the load carrying capacity of various sizes and another tire maker publishes a similar table but giving different load carrying capacities for the same size of tire. Conflicting load carrying capacities of this nature are confusing to the engineers who, in designing truck wheels, are uncertain as to the requisite tire equipment.

The standards committee is endeavoring to have all tire makers, if possible, give uniform load carrying capacity figures. The results of the present conference will be passed on in the form of recommendations to the standards committee and, if approved by the standards committee, will be again passed up to the council which will have to approve of such load carrying capacity figures before they finally become accepted standards.

Bolts for Attaching Tires

The question of the number of bolts securing different makes of solid tires to the wheels was further discussed. At present one make of tire requires so many transverse bolts through the wheel felloe to hold the retaining flange in place. Another make of tire requires a different number of bolts, so that boring holes in the felloe is necessary. To standarize this work the committee is considering the use of three different numbers of bolts for the same size tire or wheel. These are as follows:

26-inch wheel	10, 15 or 20 bolt holes
28-inch wheel	12, 18 or 36 bolt holes
30-inch wheel	(do)
32-inch wheel	(do)
34-inch wheel	14, 21 or 42 bolt holes
38-inch wheel	(do)
40-inch wheel	(do)

Different makes of tires have required different numbers of bolt holes due to the fact that in some the tire retaining flange secured by these bolts has little work to perform whereas in other makes of tires there is a constant tension on this flange and consequently more bolts are required. With the three different numbers of bolt holes in the different sized wheels, it is possible to attach any tire without the necessity of drilling new holes. For example, a 26-inch wheel may have the tire of one make held on by ten bolts, and another tire with fifteen bolts and another with twenty bolts. Where the number of holes in the felloe is greater than the number of bolts needed, the other holes are filled or plugged.

The steel wheel manufacturers were represented at to-day's meeting and they are desirous of meeting all requirements in this matter.

Another question discussed today was the objection raised by some to having a bolt hole through the spoke tenon. Some were opposed to it, others not.

Among those present were: W. P. Kennedy, chairman; C. B. Whitelsley, A. J. Slade, R. M. Lloyd, F. S. Phillips, W. H. Allen, J. Morat, W. H. Roberts, C. E. Clemmens and H. D. Church.

Says Arizona Law Is Void

PHOENIX, ARIZ., Feb. 28—Arizona's present law requiring the state registration of motor vehicles is "manifestly unconstitutional," says Secretary of State Sidney P. Osborn, in his report.

The primary object of the law, states Osborn, is to raise funds for the regulation of motor traffic. The present fees result in the collection of far more money than is necessary for that purpose. This, declares the secretary, makes the statute a revenue law and unconstitutional, as motor vehicles are also taxed as personal property. The result is double taxation.

Two dollars a year is the motorcycle registration fee; for automobiles up to 25 horsepower the fee is $5, from 25 to 40 horsepower it is $10, and machines above 40 horsepower, A. L. A. M. rating, are assessed $15 annually. It costs no more to regulate a large machine than a small one, Osborn asserts, and he claims that there is no reason for the discrimination.

Osborn also recommends that the chauffeurs' license be abolished or that applicants for such licenses be subjected to examination. Under the present law the secretary is required to issue a license to any applicant who has $2 to pay for it. "The chauffeurs receive no benefit and the public is not protected from careless or incompetent driving," the secretary reports.

All Vehicles Must Have Lights

NEW YORK CITY, March 3—A bill has been introduced by Alderman Lauren Carroll, of this city, which will require every vehicle in operation in the streets of this city to display front and rear lights. Another provision provides for shaded lights, so as not to blind or dazzle other users of the highway.

NEW YORK CITY, March 2—Partridge, Clark & Kerrigan will handle Premier cars in this district. The agency is at 239-241 West 56th street.

Changes in Insurance Rates

MILWAUKEE, WIS., March 2—That important changes in automobile policies and rates are already being made and equally important changes are in prospect was the burden of addresses and discussions during the annual convention of the National Mutual Union, embracing most of the mutual insurance companies writing health, accident and casualty business, which was held here on February 25 and 26.

The subject was precipitated by J. W. Hill, president of the Iowa State Traveling Men's Assn., who said his association during 1913 paid out $99,500 in claims for accidents from cranking and operating motor cars, this amount being equal to 25 per cent. of the total paid in claims.

The Union took no decisive action on the question, preferring to await the action of such classes of insurance companies that are more seriously affected by the motor car hazard than those represented in the Union. However, individual companies are making gradual changes. A summary of reports of the traveling men's associations shows that the increases in motor car accidents in the past year or two amount to from 100 to 300 per cent.

License for All Automobile Drivers

NEW YORK CITY, March 3—All operators of automobiles must be licensed, according to a bill recently introduced by Assemblyman Hopkins. His measure provides that every person driving an automobile shall pass an examination as to his fitness and shall be registered by photograph as in the case of the professional operator. Every automobile driver is to wear a badge affixed to his clothing in a conspicuous place at all times while operating or driving an automobile. The fee for the license to drive is to be $5. It is provided that a chauffeur in force when this section takes effect shall be deemed an operator's license.

Fig. 1—Exterior view of new Paige factory, 790 by 60 feet

Paige Opens New 60-Cars-a-Day Factory

Designed To Minimize the Handling of Parts

DETROIT, Feb. 24—The Paige-Detroit Motor Car Co., of this city, is now well settled in its new factory, which with one exception is the largest single factory building in Detroit. It is a sixty-car-a-day building, this being the possible production, although at present the output is twenty cars a day, a commendable figure for 2 weeks after moving from the old plant.

This new Paige building is a 13-to-1 design, in that it is a little over 13 times as long as it is wide. Mathematically the building is 790.2 feet long and 60 feet wide. In length it almost approaches the quarter-mile mark.

This new entrant in the Detroit factory field has a total floor space of 170,000 square feet, and is second to the present Ford plant as a single building. It measures 8 feet longer than the original main building of the Ford factory.

Fig. 4, a floor plan, shows the general arrangement of the main building with its adjuncts. The latter, while adjoining it, are separated by a firewall. Part of these adjuncts consist of a stock room, boiler room, and pump house, the stock room alone measuring 75 by 93 feet.

Good Railroad Arrangements

Situated admirably for shipping, with spur tracks running from the adjoining railway lines to the long shipping platform, the new Paige plant is an added show place to the long list of industrial landmarks of the city. The frontage is on McKinstry avenue, corner of Fort street, and the location is within a block of the Timken axle plant, and very near to a part of the Studebaker plants. It is on the west side of the city and near the Detroit river.

The plant is constructed along the most modern of architectural ideas, made of glass and concrete with steel windows. It is specially built, designed and arranged for the production of just the type of car which the Paige company makes, and for a possible capacity of sixty machines per day.

Primarily, the aim in laying out and arranging the new plant has been to reduce the handling of parts to the minimum. Elevators, stock rooms and all other departments have been as conveniently arranged as possible to one another so as to require the minimum of handling.

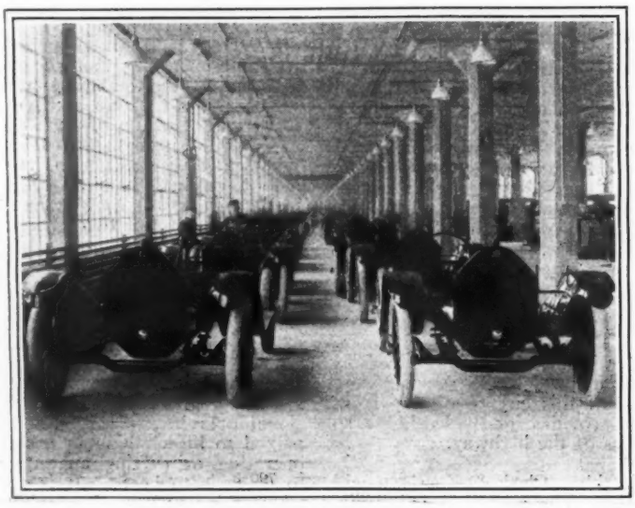


Fig. 2—A portion of the car assembly in the new Paige plant, giving an idea of the extent of the building

First Floor Scheme

On the first floor, the factory office and a showroom occupy the north end, and south of these is the machine shop. Next is the motor assembly, while the other end of the long building is the final inspection of the cars ready for shipment.

The main floor of the part adjoining the main building at the rear is given over to inspection of parts coming to the factory, to the stock of parts for the motors and back of these to the receiving room which is adjoining the receiving portion of the freight platforms.

Second Floor Layout

The second floor over the shop office and show room is given over to the richly appointed and well-arranged general offices. Next comes the car assembly occupying the remainder of the floor.

The second floor of the rear building is devoted entirely to the storage of parts for car assembly.

The top floor has in the north end the experimental and engineering rooms, beyond which are the larger parts stock room, the frame and axle assembly, and the paint shop in the order named.

The small parts assembly stock room occupies the entire space of the third floor of the rear adjoining building.

The advantage of having the paint shop on the top floor is that it is up away from the dust and the light is better. The experimental department must be also isolated, and this is accomplished by placing it on this floor.

Factory Modus Operandi

There is only one way that the parts coming out of the factory can get to the stock rooms. This is through the inspection department, with obvious advantages. There is thus no chance for parts to get to the plant which have not

been properly passed upon. They are received in the receiving room adjoining the loading platforms, from thence must go through the inspection room to get to the elevator carrying them to the two upper stock rooms, or to the motor stock room adjoining on the first.

The stock room for each assembly department adjoins it, which makes for the minimum time for getting parts and for minimum handling, as already pointed out. On the second floor are bins of parts used only in the putting together of the frame pieces and the axles, which are assembled on this floor.

Progressive Assembly Used

The various units are carried along as the parts are put on them. The motor, for instance, starts as the part of the crankcase carrying the crankshaft. This is placed on a stand which has rollers. After placing the crankshaft in position, the stand is shoved along to another assembler whose job it is to put the cylinder block in place, and so on.

In the car assembly department on the third floor the same progressive idea is carried out. The frame with brackets and other parts in place first receives front and rear units, when it is moved along a short distance. Here it receives wheels. Then later it gets the motor, then the running boards are put on, then the radiator, and so on until it has been moved to the extreme end of the floor. Here an overhead track brings the body into place. This is fitted on, after which steering wheel is mounted, then tire brackets are put on, each progression giving an added finishing touch to the car. Arriving back at the elevator, the car is all ready for testing. It goes down to the first floor, gets its test and is then ready for final inspection and shipping.

The Wide-Aisle Idea

Through each department of the factory extends a wide passageway. All stock moving to a department passes through this aisle; the finished unit moves out to the next step in production through it; and workmen and visitors going through a department are allowed only in it. In addition, material going through these aisles is handled on trucks by men whose duty it is to haul between the departments or from stockrooms to them. They are at this hauling work all the time.

By this aisle method workmen are not dodging in and around belting, nor are men going from one place to another in constant danger from exposed parts of moving machinery. There is no disturbance of the workmen by others moving through their departments to interfere with what they are doing, since the main aisles are for the purpose of getting about. This works to greater factory efficiency, to say nothing of the great factor of safety to the employees and all others in the plant.

Fig. 3—View in corner of machine shop in the new Paige plant, now operating on a twenty-car-a-day schedule, though being in the new quarters only 2 weeks

100% Moving Efficiency

Moving from an old plant into a new, and maintaining a production of twenty cars a day is no easy task, yet so well planned was the move from the old factory that not a single car was held up in production. Each department was given certain dates on which to transfer from the old plant to the new—a distance of 2 miles. This department had to work far enough ahead in its production to be able to cease operating for a few days during its moving, so that, when it again took up the production the other departments would not be ahead of it. The motor assembly department, for example, was sufficiently ahead on its moving date so as to give it plenty of time to be running smoothly in its new quarters before the remainder of the production caught up. All the new stock for this department was ready in the new factory.

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Museum for Fatigue-Eliminating Devices

PROVIDENCE, R. I., March 2—A permanent museum for the exhibition of devices for the elimination of unnecessary fatigue of factory workers was started in this city last fall by Frank B. Gilbreth, well known in motion study development.

Mr. Gilbreth considers that the terrible state of over-fatigue which is so often the lot of the factory worker is a factor in efficiency which has been overlooked to a great extent by those who have made such work a specialty.

Among the articles collected for the museum to date are a number of specially-designed chairs, stools and footrests which are already in use for the comfort of those who must remain at their work 9 or 10 hours.

The scope of the movement is broader than may at first seem apparent, the idea being to gather into a permanent exhibit all kinds of factory devices that affect the physical well-being of the worker, besides machine safeguards and sanitary arrangements. Mr. Gilbreth has the co-operation of professors and other members of the teaching corps of various colleges and universities, and hopes that the movement will stimulate thought.

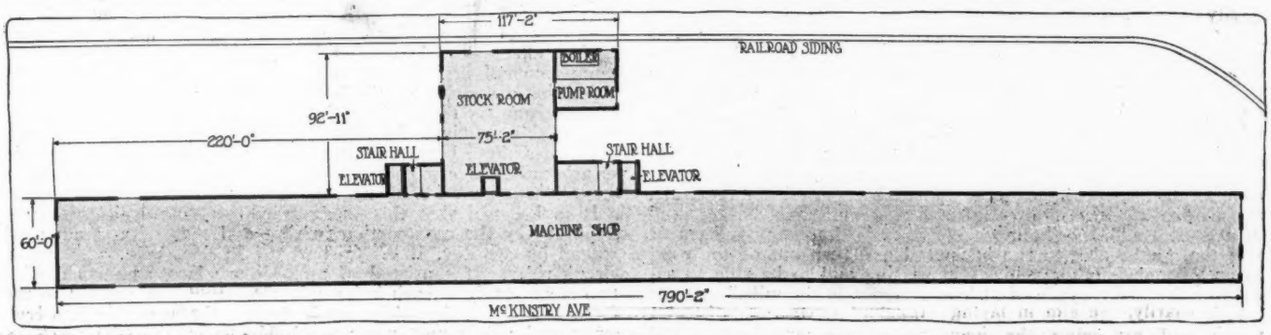


Fig. 4—First floor plan of the new factory of the Paige company in Detroit. It is 790 by 60 feet

High-Speed, High-Efficiency Motors

NEW YORK CITY, Feb. 28—D. McCall White, late works manager of Messrs. Crossley Motors Ltd., Manchester, and previously chief engineer of the Napier company in London, is at present making a visit to America, including in his itinerary the leading factories in Detroit, Cleveland, Buffalo and Indianapolis. During his career in the automobile industry in England, dating from the opening of the century, Mr. White has been directly connected with motor development as well as factory production. He has been an exponent of the high-speed, high-efficiency motor, and has not only developed these for touring car work, but for special racing purposes.

In speaking of the high-speed, high-efficiency motor, to THE AUTOMOBILE representative, Mr. White said:

"I have read with interest the views expressed by your various correspondents upon the high-speed, high-efficiency motor. In view of my many years of experience in designing and producing these motors in Great Britain, perhaps I can give some points of considerable interest.

Three Types of Motors

"There are three classes of motors at the present moment:

"First, the high-efficiency motor which gives practically a uniform torque up to 2,000 revolutions per minute.

"Second, The high-speed, high-efficiency motor which also gives practically uniform torque up to 3,000 revolutions per minute.

"Third, The high-speed motor—pure and simple—which gives torque at high speeds and which is only useful where speed and speed alone is desired.

"Taking the first mentioned engine, I think, perhaps, that practical results would be interesting. With an efficiently designed motor for touring purposes which will be silent and smooth in action, pulling a car weighing 6,260 pounds and having a wheelbase of 144 inches, I have had no difficulty in obtaining 100 brake horsepower at 2,050 revolutions per minute, the motor being a six-cylinder one with a bore of 4 inches and stroke of 6 inches, the same engine developing 50 brake horsepower at 1,000 revolutions per minute.

Again, I have designed four-cylinder engines with a bore of 4 inches and a stroke of 7 inches, developing 72 brake horsepower at 1,950 revolutions per minute and other two engines, 4 inches bore by 5 1-2 inches stroke developing 60 brake horsepower at 2,000 revolutions per minute and 4 inches bore by 6 inches stroke developing 60 brake horsepower at 1,900 revolutions per minute. All these engines were perfectly smooth and quiet in action and the compression was not over high as especially the six-cylinder engine would pull at 3 to 65 miles an hour on top gear. The four-cylinder engines were not quite so good, only being able to run on top gear at a minimum of about 7 miles an hour. It is interesting to note that the chassis weight of the car which had the four-cylinder 4 by 6-inch engine was 2,404 pounds.

"Regarding the second class of engine, that is, the high-speed, high-efficiency engine. This engine has been especially developed in Great Britain by reason of the taxation on the bore and the normous price of gasoline, as well as the ratings at Brookland's racing track, being also rated on the bore.

"These engines must be carefully designed as I have found out from several years experimenting and designing. As an example of what can be done, I have designed an engine with a bore of 2 11-16 inches and 5 inches stroke which developed 36 brake horsepower at 2,600 revolutions per minute. This engine was fitted to a chassis which had a wheelbase of 110 inches and weighed 1,680 pounds and did most satisfactory work pulling on top gear from 5 to 48 miles an hour, the acceleration also being good.

"Other engines I have been associated with have given splendid results such as a four-cylinder engine 3 1-8 by 5 1-8 inches developing 52 brake horsepower in the region of 3,000 revolutions per minute, the chassis weight being 1,900 pounds and the wheelbase 126 inches. With a torpedo four-seated body this car would touch 70 miles an hour on top gear and pulled splendidly, with good acceleration, from 7 miles an hour. With a lower gear and carrying a limousine body weighing about 1,200 pounds, the car would touch and hold 52 miles an hour on top gear, acceleration also being satisfactory.

"Referring to the third type of engine which I have mostly used for racing and also for hill-climbing competitions where we have been most victorious, we have been able to attain piston speeds of 2,800 feet per minute upon more than one occasion.

"As an example of what can be done we have been able to obtain 120 brake horsepower from a four-cylinder engine 4 by 8 inches stroke at 2,000 revolutions per minute.

"We have produced engines varying from 2 11-16 inches bore by 5 inches stroke to 6 1-4 inches bore by 7 inches stroke, the latter being a six-cylinder and world's records have been put up by engines of this capacity.

Get Gas Into Cylinder.

"The power of an engine depends upon the bore of the cylinder and the piston speed, all other points being equal. There are so many points to be considered in the design of those high-speed engines that only designers of the maximum experience can hope to tackle them. One thing must be borne in mind, and that is, that it is much easier to get the gas out of a cylinder than to get it in, so that, what the designer really wants to aim at is to obtain a high volumetric efficiency and if this is done, half the battle is won.

"I have lately been associated in experiments with engines running at 4,000 revolutions per minute, the piston speed being 3,200 feet per minute and astonishing results have been attained. I am hoping before long to be able to reach higher speeds than this, as it is not so very many years ago when we were struggling to attain, with satisfactory results, speeds of 2,500 revolutions per minute.

" Great success has also been attained with engines running at 3,600 revolutions per minute and this has been under my observation for a period over a year, the piston speed being 2,880 feet per minute with highly satisfactory results.

"In order that there should be no doubt about the question of high speed, high efficiency engines, I may add that we have found it possible to give a 3 years' guarantee with every car, the engines of which run and develop maximum power at 2,600 revolutions per minute and engines developing maximum power at 3,000 revolutions per minute have been under my notice for considerably over a year in touring cars with gratifying results."

Wisconsin Claims Early Patronage of Motor Vehicles

MADISON, WIS., Feb. 28—John S. Donald, secretary of state of Wisconsin, has recently completed research into the musty records of the state department at Madison which indicate that Wisconsin was the first commonwealth in the United States to attempt to induce the perfection of a horseless vehicle. In 1875, he finds, the Wisconsin Legislature passed a law offering a bounty of $10,000 to be paid to the person who invented and put into operation a machine that would "perform a journey of at least 200 miles in a continuous line on the common road or roads running as nearly as may be north and south within the state, and be propelled by its own internal power at the average speed of at least 5 miles per hour working time." Another requirement was that "it be able to run backward and turn out of the road to accommodate other vehicles in passing and to be able to ascend or descend a grade of at least 200 feet to the mile."

It is recorded that an amendment to the law was made in 1876 providing for a statement of progress in the manufacture and the intention of competing for the bounty, to be filed with the secretary of state. Secretary Donald finds that eleven such notices were filed. An act of 1878 authorized the governor to appoint a commission of three to act as judges at the trial and provided for a meeting of the commissioners at the city of Madison on June 10, 1878. There is, however, no record of competition at this meeting. In 1879 the legislature repealed the bonus laws, providing, however, an appropriation of $5,000 to be paid as a bonus to five parties as compensation for their expenses in the construction of a steam road wagon.

It is believed that this interest by the state legislature was prompted by the construction in 1873 and 1874 of a steam road wagon by the Rev. J. W. Carhart, of Racine, Wis., who was a circuit-rider. It consisted of an ordinary buggy equipped with two steam engines, each independent of the other, applied to the front and rear axles. The crude devices threw people into hysterics and public meetings were held condemning the machine.

Some Special Uses for Multiple Drills

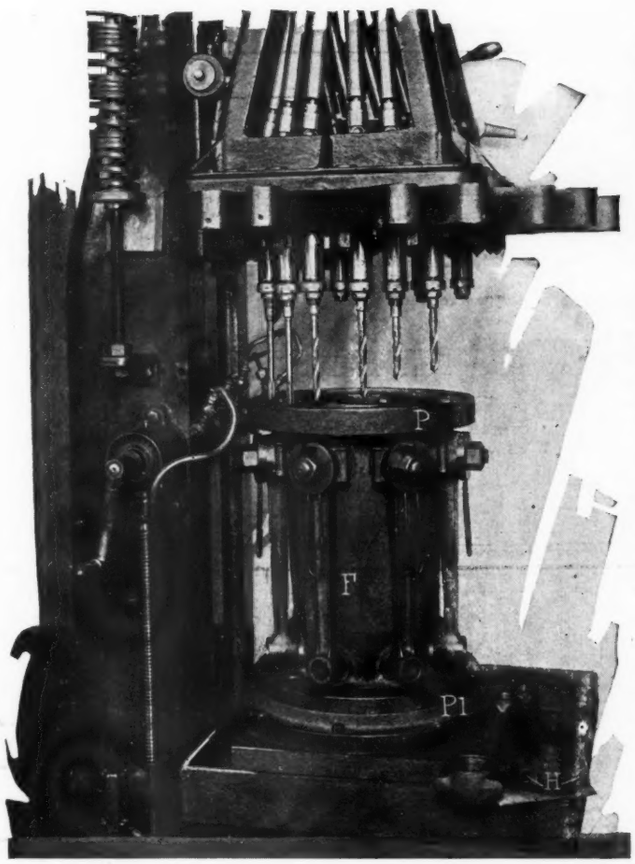


Fig. 1—A multiple drill used for drilling the holes H for the bolts which fasten the connecting-rod cap to the rod proper. The universal fixture F carries seven connecting-rods on which six operations are performed every time the drills are lowered

EVERY factory has its equipment of multiple spindle drills used to bore a number of holes at the same time in order to increase production. Not infrequently these drills are idle a fraction of the time because the factory output is not sufficient to keep them busy. The Marmon company has developed a new use of the multiple drill in which it is used for the manufacture of small parts ordinarily made in other ways. Two examples of using multiple drills for small part manufacture are shown in Figs. 1 and 2. Fig. 1 shows how a multiple drill is used for drilling the holes H for the bolts holding the connecting-rod cap to the rod proper. To do this what is known as a universal fixture F, which carries seven connecting-rods, is fitted between upper and lower plates P and P1. By this arrangement every time the drills are lowered the complete operation of finishing a rod is done, that is, the two holes are drilled, counter-drilled, and reamed, six operations in all. This is done by working on the different rods at the same time, thus while one set of tools drill the holes in one rod, other drills are counter-drilling the holes in another rod, and still other tools reaming the holes of other rods, and while the machine is doing this drilling and reaming act, the man operating the machine is putting other rods in place on the fixture F. With this machine a man can finish twenty rods an hour or 200 per day. The holder or fixture F is turned by hand. In the upper jig plate P are the bushed openings to receive the drills, and this jig plate is integral with a corresponding one P1 at the bottom. There is on the bottom plate an index which automatically locks the fixture F in the proper position for drilling the holes.

The second example of adaptaing the multiple drill to small parts manufacture, is that of Fig. 2, where it is used to drill and ream the six holes in the bearing block B, used for supporting the crankshaft. Each block is mounted in a jig J, four of which are supported at once on the revolving universal fixture C. Drilling is done on three of these bearing blocks at once, the fourth being always idle for replacement. One set of drills make the four corner holes; at the same time the drill for the next fixture drills the two center holes, and at the same time the four corner holes are reamed in the third fixture. Thus is the one finished bearing block made every time the drills come down; in other words, ten operations are accomplished simultaneously. This machine has a capacity of twenty-five per hour. Such operations would be impossible in the conventional multiple drill, yet with this arrangement one man can turn out 1,500 pieces per day.

In the Marmon plant similar fixtures are used and twelve to fifteen different pieces made in this way, some of these being equalizing beams for the brake system which are handled at a rate of 30 seconds each, or 180 per hour.

With a battery of drills of this class the production of the factory per unit area is remarkably increased and the cost is cut from 25 to 50 per cent. on parts that are turned out in quantity. The advantages are obvious.

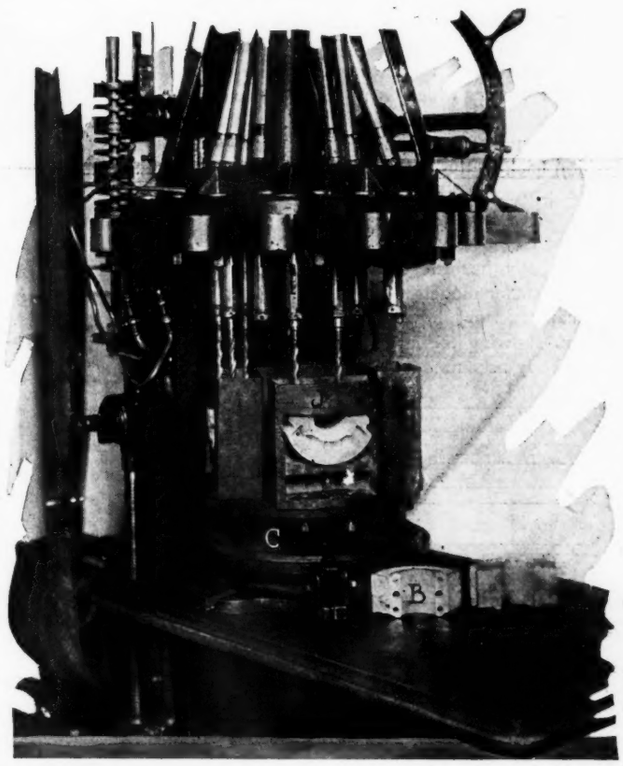


Fig. 2—Multiple drill used to drill and ream the six holes in the bearing block B used for supporting the crankshaft. Drilling is done on three of these bearing blocks at a time, the fourth being always idle for replacement

Cabriolet Design for Cadillac Chassis

Top Is of Simple Construction and Folds with Small Overhang

THE accompanying illustrations of a single cabriolet body show a type of all-weather car which, as indicated by the recent shows, still retains its place as a model town car. It is popular because of the simplicity of the mechanical construction of the top that allows any one not previously experienced to operate it without difficulty. It is slightly less complicated than the cabriolet with the quarter light; it is shorter, has fewer parts and folds closer when down.

The open position has all the touring body advantages and when closed this type of car forms a comfortable storm and dustproof vehicle. The desire to have all the window space possible is not shared by all car owners. Many prefer more privacy than large windows afford. Especially is this so for shopping, etc., and the design illustrated gives attention to this feature. The outlook forward through the door and front windows is sufficient for air and general observation, while the fair-sized window at the rear takes care of the lookout from that quarter. The extension roof over the driver, which is in harmony with the general design, is fastened to the windshield at the front, and folds concertina fashion back to the front posts. This, with the windshield, forms ample protection for driver, and at the same time does not obstruct the hearing of all sounds, which is very essential for cars for city use.

This body has the same appearance, as regards the top, as had the earlier models. There is a special feature in the mechanical construction, however, that allows the top to lay down without showing the large gap at the cut in the rear pillar.

The body accommodations are for five people in an emergency, that is, three on the rear seat and two on the folding seats facing back. The normal accommodations are for two on the rear seat and one passenger on one of the folding seats facing across the car.

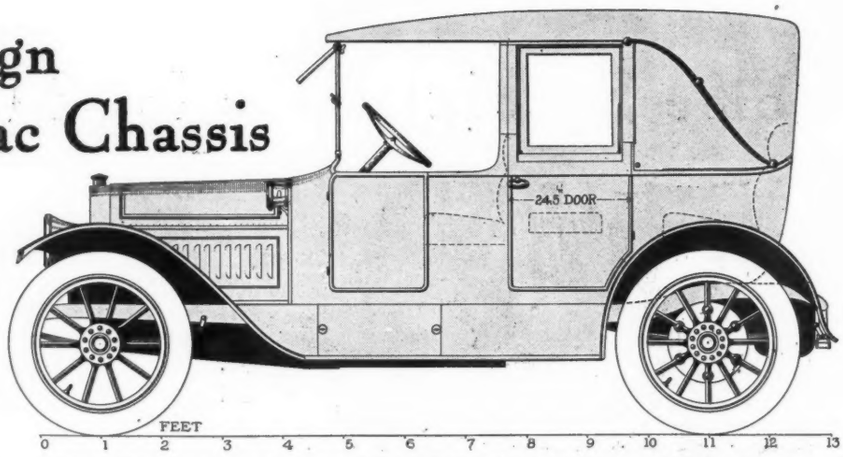


Fig. 1—Side view to scale of suggested cabriolet body adapted to Cadillac chassis

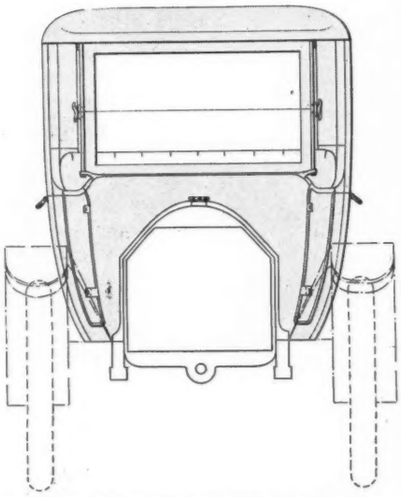


Fig. 2—Front view of cabriolet design

To show this body in a practical manner it is mounted on a standard 1914 Cadillac, having 120 inches wheelbase. Fig. 1 shows the finished design, with the top up as a closed body, and Fig. 4 the construction and appearance of the top down as an open car. In order to accommodate the body to the standard chassis the rear door is shown with a cutout. The door is made 24.5 inches wide, this being the limit which will allow the glass frames to drop level with the door bar. These two views are self explanatory of the flush side and the straight lines effect given to the design.

Folding Top Is Simple

The mechanical features of the top, Fig. 4, are English patents, and by their use the length of the quarter, or distance from the back of the door to the end of the body at the rear can be made almost any length required. On the design illustrated the quarter is 7.5 inches longer than the ordinary landaulet fixtures would allow, and this could be extended if desired.

The operation of folding the top down is as follows: First the roof over the driver is unlocked from the windshield and folded back until the front bow is level with the front pillars,

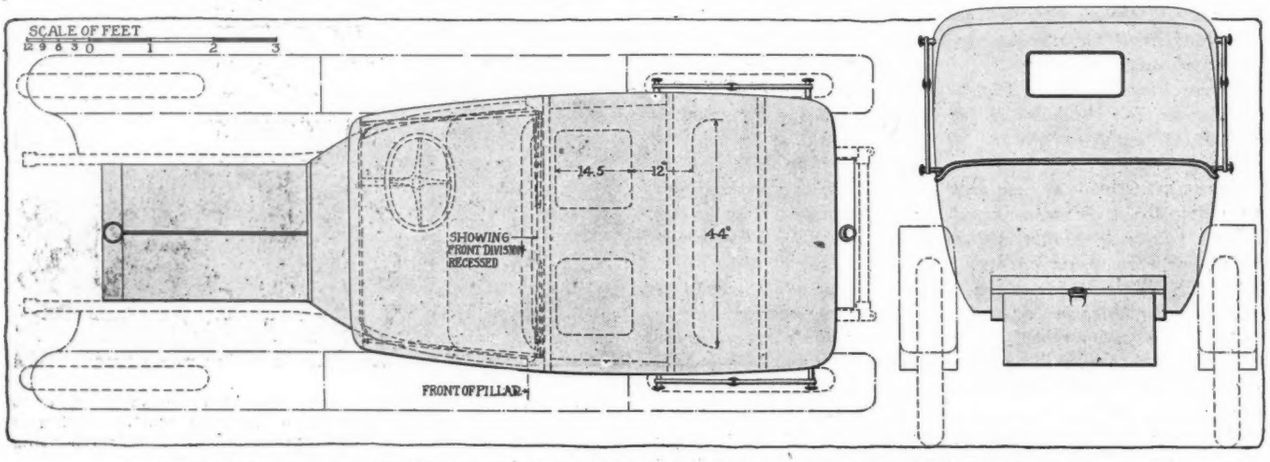


Fig. 3—Plan and rear elevation to scale of cabriolet body design, showing size and disposition of seats

as indicated by A and A1, Fig. 6. The top rail is then unlocked from the top of the front pillar and revolved on its hinges, as indicated by the arrow, the joints are broken, and the top collapses and folds down as illustrated. This is effected by the rear part of the top revolving on the center C. In this way the two rear bows are carried well back. The bow-pillar D is connected to the pillar E by a slider arrangement, in such a manner that as the latter falls the iron support that hinges at C forces the pillar D to move upward on the groove connecting it with pillar E. This latter has its hinge center at the cut as indicated. The action of having the two hinge centers is that in falling the bow-pillar D is lengthened, being connected by the grooved slide to pillar E, and as the top material is attached to the moving part both the top covering and the bow part of the pillar D are carried beyond the line of the seat back.

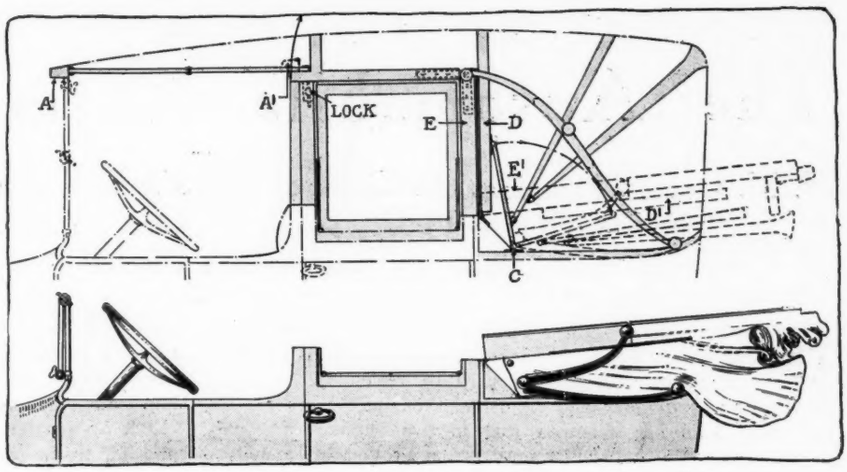


Fig. 4—Bow construction and method of folding compact cabriolet top

The center C is located according to the length of the parts, its purpose being to throw the bow D just far enough back to clear the seating. The arc of the circle and the arrow show the travel of the bow D on its hinge, and the automatic sliding of the pillar on the support.

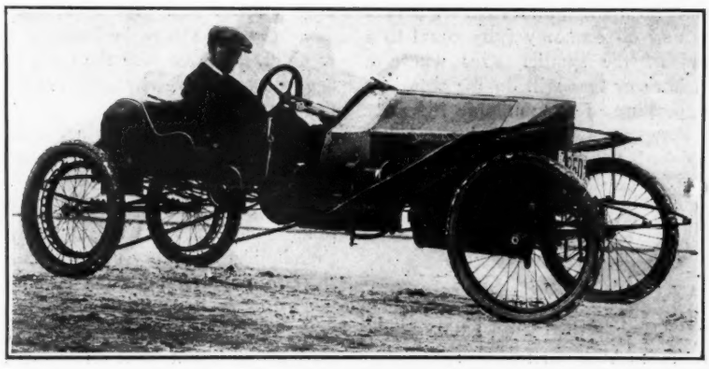
The glass frames in the doors are held in place by flappers and agree with regular landaulet practice. The front pillars are made to swing inward, landau fashion, but in the case in hand this action is not used, the pillars being lifted out bodily from above the cut and stowed under the front seat. The reason for this is evident in the plan view, Fig. 5, in which the front division is shown recessed back from the front line of the pillars, allowing the driver sufficient room. The forward position of the front pillars also permits the use of a large door. If the pillars were to fall inward in the usual way they would lie across and interfere with the seat room of the driving seat, therefore by taking them out entirely they serve their purpose when required and when the top is down are easily put out of the way.

The finish and appointment for a body of this type are pretty well regulated by custom; the top material should be a fine quality of landau top leather and on the under side the lining should match the cloth used for the interior trimming. This latter is generally a mixed goods, with silver mountings and mahogany or walnut wood for the glass frames and woodwork. The driving seat is trimmed with black leather and the customary blue with black guards and moldings for the painting. As the top folds there will be an opening through the front glass for communication in place of a megaphone. The interior light should be a reading lamp fastened to the underside of the rear bow.

A body of this character will cost approximately $1,800.00, and the weight will be about 900 pounds.

High School Freshman Builds Interesting Cyclecar

HARTFORD, CONN., March 2—To P. H. Spencer, a freshman in the Hartford public high school, attaches the distinction of operating the first cyclecar on the streets of Hartford. The young man is the son of a well-known inventor and brother of the local Kisselkar agent. During his spare time after school hours he constructed the vehicle shown in the accompanying illustration.



Side view of the home-made cyclecar devised by P. H. Spencer, of Hartford, Conn., with the builder at the wheel

The power plant comprises two single-cylinder, copper-jacketed, Thrall two-cycle marine motors coupled together, with cranks opposite, flywheel attached to the forward end of the front engine shaft. The engines are attached to steel rails parallel with the frame rails. Bore and stroke are 3 1-2 inches. Spencer says the two small engines, formerly used in a displacement speed boat, show 6 horsepower and drive the car at 35 miles an hour.

The transmission is friction, the driving disk of bronze, 12 1-2 inches in diameter, the driven member being cast iron with fiber facing and 13 inches in diameter, having a 1 1-2-inch friction face. The latter was taken from an old Metz car. The friction wheel is caused to travel on a splined shaft by means of an old brake lever. Contact is maintained by a pedal. Final drive is through 7-8 V leather belts, jackshaft pulleys 9 inches in diameter and rear wheel pulleys 18 inches in diameter. Spencer says that on the high gear a ratio of 2 3-4 to 1 is obtained.

The frame is made of angle iron, 1 1-2 by 3-16, the front springs are semi-elliptic, 30 by 1 3-8 and the rear full elliptic, 30 inches long. The cooler is carried forward of the foot boards and was taken from an old Ford car. Wheels are wire fitted with 28 by 2 3-4-inch tires. Wheelbase is 100 inches and tread 40 inches. Ignition is from battery and single unit Connecticut coil. At present canvas strips serve for fenders. Metal ones are being made. The owner states he will build another car for his own amusement to be equipped with a four-cylinder, water-cooled motor.

The Automobile Engineers' Forum

H. M. Crane Champions the Cause of the Six-Cylinder Motor as Compared to the Four-Cylinder Type—Thinks It Can Be Even More Economical Than the Four When Properly Constructed

BAYONNE, N. J.—Editor THE AUTOMOBILE—In view of the fact that G. N. Thurber asks for comment on his letter in THE AUTOMOBILE for February 19, regarding the comparative power of four and six-cylinder engines, I am led to take issue with his statement that in two engines of equal piston displacement and similar construction a four-cylinder motor will give considerably more power than a six.

An experience of 8 years in the design and construction of both types of engine has shown me very clearly that there is little, if any, difference between the two, this difference in our own engines being distinctly in favor of the six-cylinder. There are only two possible reasons why there should be any noticeable difference in power between the two types, one being a difference in volumetric efficiency and the other a better distribution of the fuel mixture in one type than in the other. The first of the propositions is a very simple matter, but the second has been a stumbling block to many designers of six-cylinder engines. The inlet pipe design of a four-cylinder engine is much simpler than that of a six, and a carbureter design which will work satisfactorily on a four-cylinder engine will not give any results at all on a six-cylinder.

Modern Six Economical As Four

The hurried completion of the design and insufficient testing of many six-cylinder engines has undoubtedly resulted in a great deal of unsatisfactory service from such engines, and this has been coupled with the fact that until very recently no proper carbureter could be obtained for engines of this type. Today, however, inlet pipe design and carbureter design have advanced to a point that allows each cylinder of a six-cylinder engine to do its full proportion of the work, the result being power fully equal to that of a corresponding four-cylinder and a smoothness of operation, lack of vibration, and steam engine flexibility that a four-cylinder engine can never hope to equal. I will go further and say that in two cars of equal weight, equal piston displacement and equal rear axle gear ratio a six-cylinder car of proper design will give fuel economy and oil economy fully equal to a four, except, possibly, in cars of the smaller sizes where a four-cylinder engine of 4-inch bore or less will do the work.

In writing the above, I am speaking of cars suitable for daily use in touring. For racing purposes a four-cylinder car has preponderating advantages, which, however, have nothing to do with the relative possible power of the two types.—H. M. CRANE, President Crane Motor Car Co.

Some Reasons Why Batteries Do Not Hold the Charge

CLEVELAND, O.—Editor THE AUTOMOBILE—CAR OWNER: "My battery will not hold the charge."

BATTERY MAKER: "All your battery needs is proper charging."

This comment and the reply go hand-in-hand in every state in the Union. Because of the battery not holding the charge, as natural and logical is the answer.

The car owner could, in the majority of cases, have been advised by the battery man just why his battery needed charging; and, by inserting an ampere-meter in the charging circuit and ascertaining how much current was going into the battery at 15 miles per hour, the owner could have been saved considerable inconvenience. The machine should be generating at least the lamp load at this speed of the car.

Lack of general knowledge of the characteristics of storage batteries, on the part of both dealers and owners, is responsible for their universal neglect; and nobody worries until the battery "will not hold the charge." Except in rare instances, this condition is directly due to continuously undercharging the battery.

Insufficient charging may arise from a variety of causes. In some cases batteries are some time in transit, necessarily without charging during this period, and when they are received by dealers with new cars many do not understand the importance of giving them necessary recharging. They may also remain on the showroom floor and be used for frequent demonstration of the starter without running the motor and charging generator long enough to give the battery an appreciable amount of current.

In some instances batteries that have stood in cars on a showroom floor from 1 to 3 months are delivered to the purchaser without any attention or recharging; and while even with such absolute abuse the battery may give service for a few weeks, it is only a short time until the owner complains that his battery "will not hold the charge."

Generator Below Par

This undercharged condition can also be brought about by other causes. It is possible for the generator to be out of order and fail to deliver current, or a break, or ground in the circuit may prevent the generated current from reaching the battery. The service demanded from a lighting and starting system may also be abnormal and cause this condition. For example, a physician, or business man, may drive short distances and make many stops. In this case the demand on the battery for starting is heavy, while the generator is not run long or fast enough to replace only a small part of the current taken from the battery. The same condition may be brought about by using the car largely at night, in which case the lamp demand is heavy while the mileage and speed are not sufficient to replace the current used from the battery.

In other cases there is a constant discharge from the battery when the car is not used, and at the end of a week or 10 days the battery is nearly exhausted. Under such circumstances the current furnished by the generator under normal driving conditions is not sufficient to supply everyday needs and at the same time build the battery up to its maximum state of charge.

At this point the battery is usually removed from the car and taken to somebody for recharging. Most electricians, or garages, will charge the battery over night, or for 24 hours at most, and the battery is put back on the car. Unless the previous neglect has decomposed the separators, causing one or more short circuits, it seems to work all right and the owner is pleased. But within a few days the battery is again exhausted and "will not hold the charge." Now the owner is certain that he has a "defective" battery. His lights are very dim, the starter will not turn over the engine, and he writes the manufacturer of his car or the manufacturer of his battery at great length, demanding a new battery forthwith.

The real fact in all such cases is that there is no fault whatever in the battery itself, but it is literally starved. To make this clear, let us compare a battery with a man. A man is able to perform a certain amount of work as long as he is getting the necessary amount of sleep and food. If he is gradually deprived of either, his powers will become less and less and the work he is able to accomplish will be reduced in the same ratio. Soon he will not be able to perform his regular duties and the condition carried to its ultimate conclusion will result in death.

Brought Back to Life

An abnormal amount of sleep and food will bring a starving man back to an efficient condition, providing his vitality has not been run down too low. In the same manner a starving battery may be brought back to a condition of efficiency by prolonged charging with electric current. In both cases the services of an expert "doctor" are required. The battery doctor puts the battery on charge at a very low rate that will not cause it to heat above 100 degrees Fahrenheit at any time, and continues the charging, testing the gravity of the electrolyte at frequent intervals by means of a hydrometer syringe. If, after 2 or 3 days' continuous charging, he finds that the gravity is still below normal and is still rising, he keeps on charging until he fails to get any higher gravity reading in any cell. In some cases the rejuvenation of a battery can be accomplished in a few days, but in aggravated cases it may take from 10 days to 3 weeks' continuous charging to bring back the normal capacity of the battery.

It must be borne in mind, however, that while the battery may give good service for perhaps a long time, a certain percentage of its life has been sacrificed, just as the emaciated condition of a starving man reduces his constitutional powers and shortens, by a certain percentage, the term of his life.

With batteries, as with nearly everything else with which we deal in this world, "an ounce of prevention is worth a pound of cure." A wise motor car owner will buy a hydrometer syringe and learn how to use it. He will make tests of the electrolyte in all cells at least once, and preferably twice each month, and if he finds any cells reading below 1.250, he will see that the battery gets enough extra charging to bring the gravity up to a maximum of 1.275 to 1.300 in all cells. If the battery is not too badly undercharged, this can be done best by driving the car a long distance at a good rate of speed, or by running the motor in the car with the car standing idle.

If, however, the condition requires an unusual amount of charging, it will be necessary to remove the battery from the car and put it in the hands of a battery physician for the necessary reforming charge. If the physician is a quack, or lacking in knowledge of his business, he may half-charge the battery and then, because the gravities do not come up to normal, "dope" the low cells with higher acid solution to make them give the correct reading. Such treatment will further aggravate the condition of the battery, and such a doctor ought to be prosecuted.

To sum up the whole matter, a storage battery is electrochemical and not mechanical. It must not be treated as one of the mechanical parts of the car. The rules governing its proper care are simple and can be easily mastered by any person of average intelligence. It needs little attention, but it must have that little and must have it regularly and systematically.—H. S. BENTLEY, Manager Service Department, Willard Storage Battery Co.

The Philosophy of Solid Rubber Tires

AKRON, O.—Editor THE AUTOMOBILE—Solid tires, like trucks are built to carry so much weight; habitually exceed that and trouble begins. The tires break down, chip and wear so rapidly that almost no dividends are realized on the investment made when the shoes were bought. Learn what tire equipment the use to which your truck is put demands. Provide for the maximum load which the car will ever carry, and your tire troubles will be minimum, providing, of course, that the tires used are of good rubber, skilfully compounded and are of the right design or pattern.

Pure Rubber Not Used

Pure rubber alone does not enter into the composition of any tire. The gum is compounded with chemicals, to give it the necessary wear-resisting qualities. But in compounding care must be exercised that resiliency is not sacrificed to wearing qualities or vice versa. It is necessary that a happy medium be arrived at.

Tires of hard compound have been offered where high mileage guarantees have been made. Were roads perfect, with no inequalities, then a hard tire would be desirable. It would wear gradually, its mileage everything that one could wish for. But with perfect roads, it hardly would be necessary to equip with rubber tires, for tires are merely cushions between the roughness of the highway and the delicate mechanism of the car; in other words, they are adjuncts to the springs. Therefore, on the roads of today, a tire with a high mileage guarantee, made hard that the latter may be fulfilled, eventually is more expensive than a more resilient tire, with a shorter life. All jolts and jars are communicated directly to the mechanism of the truck, tending to loosen parts and jar them out of true.

Hard Tires Devour Power

The hard tire, too, is an excessive power consumer. When an obstruction in the road is hit, the tire, being hard, must be lifted entirely over the stone, or whatever the obstacle is. There is never any displacement of the rubber. Use a hard tire and you must submit to frequent repair charges and tire adjustments.

There is a point of economy where tire efficiency and durability meet. To obtain this proper union, the tire must be resilient, which means that it must carry a greater percentage of pure rubber than a hard tire. When this truly economical tire meets the inequalities of the road, it tends to absorb them. There is no cutting action because impact force is distributed—the tire actually becomes a cushion between the road and the truck mechanism. By thus absorbing the road inequalities, instead of lifting the wheel over them, a saving also is effected in power consumption. —L. GREENWALD, Firestone Tire and Rubber Co.

Fenders Have Two Objects — How To Attain Them

DETROIT, MICH.—Editor THE AUTOMOBILE—It seems to me that fenders have two great objects: First, to stop as much mud as possible from getting on the car. Second, to make it as easy as possible to remove that which cannot be stopped from hitting the car.

The difficulty in stopping mud thrown from the wheels is that the fender cannot fit down closely enough to the tire on account of the spring action. In designing the Chalmers molded oval fenders it was the idea of G. W. Dunham to get a fender which would stop all the mud thrown off the top of the wheel, and at the same time give plenty of clearance for the spring action. First, because the sides of the fenders come well down over the side of the wheel, and at the same time allow plenty of clearance and room so that the top of the wheel and the side of the wheel do not strike the fender. So much for shape.

In addition we have made the interior of the fender perfectly smooth, and the shape is such that the mud thrown off the top of the wheel strikes the fender and is directed back to the ground. The rounding shape of the fenders assist them, whereas

(*Continued on page* 550)

Grinnell Has Model Service Station

Detroit Establishment Attends to Every Detail of Maintenance for Owners—Handles Over Sixty Cars a Night

SERVICE as applied to the marketing of the electric vehicle takes on a different meaning today than it did several years ago. It has now come to be regarded as the greatest asset that the aggressive dealer can have. It means close attention to every detail connected with the maintenance, charging, battery up-keep and general outward appearance of a vehicle which is quite generally regarded as a woman's car. To relieve the woman driver of every responsibility connected with the machine, save that of driving it, has meant the development of service stations which are equipped to handle efficiently all phases of the car's maintenance.

Such a service station is that of the Grinnell Electric Car Co., at Detroit, which has storage space for seventy-five electrics, and on the average night charges and puts in the "pink of condition" sixty-two cars ready for the "chasers" to leave at their owners' doors the next morning.

The main garage of the Grinnell plant is 100 feet in length and about 45 feet wide. In addition to this there is an overflow space of the same length and about 90 feet wide. Both parts are interconnected by a door, as shown by the plan herewith. The showroom is located in front of the garage proper and houses all of the concern's demonstrators. The overflow storage space extends to the corner of a side street and with two doors opening onto this street, easy entrance to the main garage is obtained. The general scheme is for cars to enter through this side street and leave through rear doors into an alley, so that they all move in the same general direction.

Cars Ranged Along Walls

Most of the charging plugs are located along the south wall, there being twelve charging rheostats here. On the opposite side there are eleven more, while the overflow garage has eight rheostats on another side. Thus the cars are arranged in lines along the walls, leaving plenty of space for vehicles to pass between the two rows.

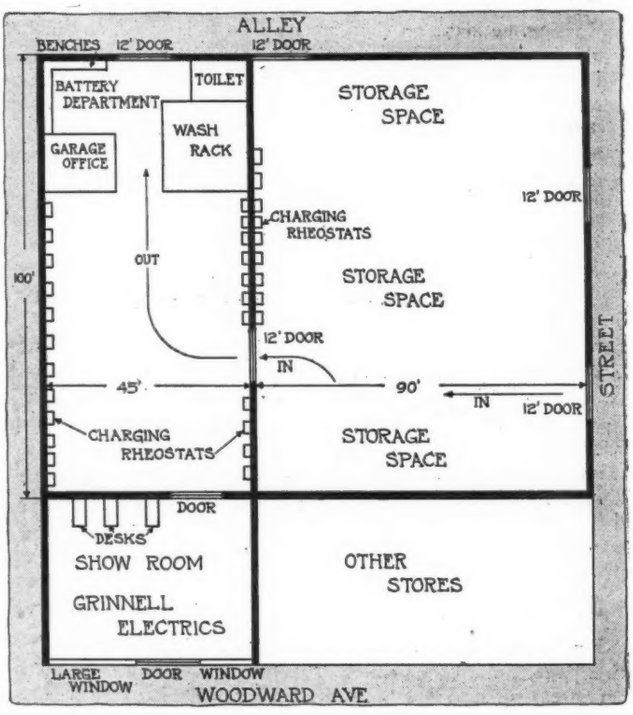
Since direct current is available, no rectifiers or transformers are needed, and the charging apparatus consists merely of resistance for varying the current during the charge. The rheostats are of Westinghouse make, style 77441, rated 50 amperes, 55 ohms, 110 volts. Above each there are fuses to protect the car wiring and other electrical apparatus, should the current be sent in too fast.

At the rear of the charging part is the wash rack, the garage office and the battery department. Since this is exclusively an electric garage, no elaborate mechanical repair shop is needed, the repairs which are done to the running gear and driving mechanism being minor ones, mostly in the form of small adjustments. In the event of a car meeting with an accident which damages its running parts considerably, it is sent to the factory in another part of the city, no large repairs being attempted at the service station.

A part of the monthly service rendered an electric car owner which is peculiar to the electric is the delivering and calling for the machine. In the morning the owner finds the vehicle at the door ready for the day's running and at night, when through with it, he simply calls up the garage when a chaser is sent to bring it to the station for recharging and cleaning.

The Grinnell company employs four of these so-called chasers whose business it is to bring the cars to and from the garage. There is a day force and a night crew. Some owners have a regular time for their cars to be at the door each morning while others 'phone in each day when they desire them. In either case, the owner steps into the vehicle at his door in the morning when he wants it and steps out of it at his door at night.

When the owner telephones the Grinnell station at night that he is through with his car, a man is sent out for it. Arriving at the garage, the man records on a sheet the time of arrival. In order to get the car, this chaser must have keys to unlock the door and the controller. He gets these from the keyboard. Here



Plan of the ground floor in Grinnell electric service station in Detroit

duplicate keys for each car are hung on pegs corresponding with the owners' names.

The car is then driven onto the wash rack where it is completely cleaned and polished by workmen. One man at the Grinnell garage washes on the average forty cars per night. Having thoroughly cleaned the vehicle, it is next put on charge and under careful supervision, the battery is brought up to capacity for another day's running. Next morning, the chasers redeliver the cars, noting the time of taking them out on the sheet.

Having seen the general procedure followed, look more carefully into the details of this service. To fully care for a car, the concern charges $35 per month. This includes battery charging every night, washing and polishing each night if desired, battery care once a week, general inspection of all parts weekly, oiling all running gear and moving parts weekly, touching up rims where they have become scratched by curbs, one delivery and one return to the garage each day.

Where the services of a chaser are needed more than once

each way daily, a nominal charge of from 25 to 35 cents is made, depending upon the distance the man has to go.

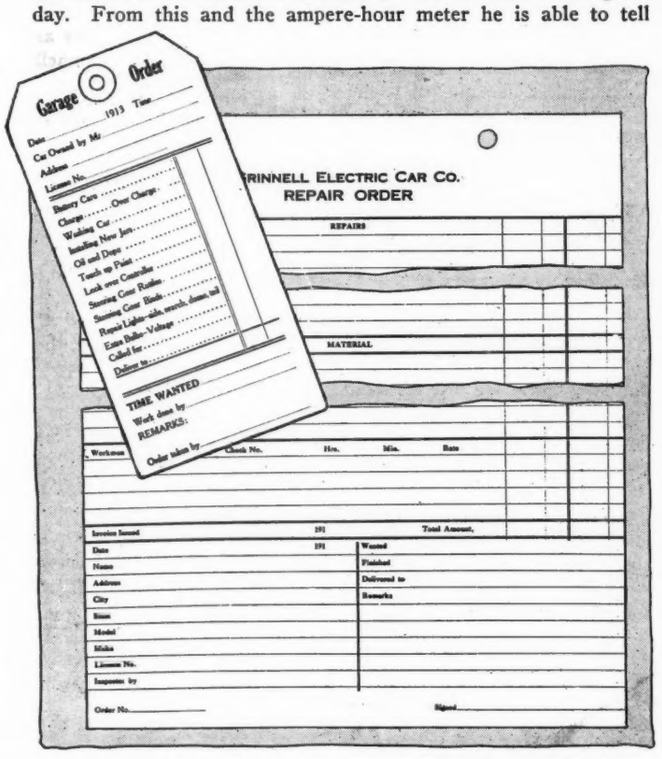
Minor repairs also come in gratis, but of course large repair jobs are charged for extra.

The service does not end here however, for a repair man is in readiness day or night to go to the aid of a stalled car, a service being kept at the garage for this purpose.

No part of the electric vehicle must receive as much attention as the battery. Its whims and ills must be diagnosed by someone who knows his business. At least a year's experience in battery work is necessary before a man can know just what to do at all times. The battery man should be an electrician, for without the knowledge of electricity, he would be obviously unable to work satisfactorily.

The Grinnell plant employs an expert battery man whose business it is to keep each car's cells in good condition. He is capable of assembling batteries, repairing damage done by explosions, wash the jars, and, in a word, "knows his business."

When the car comes in for the night, the charger first reads the odometer to tell how much the car has been used during the day. From this and the ampere-hour meter he is able to tell



Blanks used in keeping records of cars in Grinnell electric service staton

how nearly discharged the battery is, determining the charging rate from the amount of current he must get into the battery by morning. The cars are put on a tapering charge, that is, they are charged at 25 amperes for three-quarters of the charging time, and for the remaining quarter this is cut down to 10 amperes. These are the average figures, some batteries requiring different rates as determined by the man in charge. All night long the battery man is continually inspecting the cars on charge, cutting down the current charging rate of any battery which heats up and cutting off any one which is fully charged.

Once a week the car owner must leave the car at the garage for about one-half day for battery care and inspection. About seven cars a day receive this attention at the Grinnell station. Every cell in the car is tested for gravity and voltage. A hydrometer syringe is used to test the former, and when fully charged each cell should read about 1,280 specific gravity. Fully discharged cells have a gravity of about 1,140. The total voltage after the battery has been charged should be about 2.5 volts per cell or 75 volts for a thirty-cell lead set, or 100 volts for a forty-cell lead battery. If any discrepancies are found when these readings are taken, the battery man can easily detect the weak cells under this individual testing.

When a weak or non-charged cell is located in a battery, this one is taken out of the car and charged separately in the battery department. It will usually come up to specifications on this individual charge unless something is the matter with it such as plate bucklings, short circuiting of the plates and so on. Its failure to come up to charge when all were charged collectively might have been due to any one of a number of causes, but when the battery care is over, all cells should read alike and be fully charged.

But the main thing in battery care and the only one which usually has to be done to the average battery on battery care day is the "flushing" to bring the electrolyte to about .5-inch above the plates in each cell. Pure water is added until this level is reached. It may have become low, due to splashing over, evaporation or several other causes, but oviously if the deficiency in level were not taken care of occasionally, the liquid would soon dry up and then the call would not be active.

It will be remembered that the electrolyte has an important function to perform in the storage battery. When the battery is put on charge, electrolysis begins, decomposing the fluid and gradually increasing its specific gravity. The lead particles are transferred to the positive plate which becomes lead peroxide while the negative plate becomes sponge lead. The electrolyte is sulphuric acid when the battery is up to charge.

Battery Department Is Complete

The battery department at the Grinnel plant is typical of that necessary for proper care of this all important part of the electric car. In it, two men can build up a forty-cell set complete in a day from the parts. Besides the usual benches on which to set the jars under attention, there are the necessary instruments such as a combination voltmeter, ammeter and low-reading voltmeter for reading the individual cells all of these being within the one case for convenient carrying around, hydrometer, thermometer for testing the temperature of the cells under charge, a hydrogen gas burner for melting connectors to the battery terminals and for assembling battery plates, a plate rack for ready assembly of plates and various minor tools.

A complete stock of all battery parts is also kept so that the minimum delay is necessary in battery repairs.

To wash a battery, the standard charge is $1 per cell, which means $40 for a battery of forty cells, and so on. This washing consists of cleaning out the sediment from the plates which collects in the bottom of the jars. Should sufficient sediment collect to fill up the open space below the plates, a short circuit would be made, rendering the cell ineffective. However, with the new non-wash jars, the sediment space is made large enough to hold all the sediment which could fall from the plates in the jar, so that, when this space gets full, the plates are useless anyway, making jar washing unnecessary during the life of the plates.

In the battery department also there are plugs for charging cells separately from a low-reading rheostat, making it possible to get an adjustment for charging from 7.5 to 50 amperes. This is very fine regulation when it is considered that only one cell is being charged.

On the wall in the battery room are also the main electrical instruments of the plant, consisting of recording ammeters which indicate how much charging current is being used at any time and also how much was used during the previous night. These instruments are read every 24 hours and the records kept so as to arrive at costs.

For charging a vehicle, outsiders are asked $1 at at the Grinnell station. Other charges are: Washing and polishing, $1; washing and charging $2; battery care $1.

In the washing of the finely-finished electric vehicle, experience again plays a part. It is a great deal more of a specialty than most people believe, and is an operation requiring much care.

In the Grinnell station, there are several clusters of electric lights with reflectors playing upon all corners of the wash rack so that every particle of dirt and mud upon the vehicle will show. The water used contains little or no soap for soap is an enemy of lustrous finish. The very finest of sponges and chamois are used in the work, for these must contain no grit which would scratch.

Furniture polish is sometimes used on the body to aid in the polishing.

Compressed air is used to blow all dust out of the upholstery and interior of the car. And to preclude any possibility of this upholstery from being soiled by the workmen, a piece of cotton cloth is pinned over the seat while the car is in the garage or on its way to or from it. This cloth is folded up and placed under the seat when the chaser reaches the owner's home. He puts it back on the seat again when he comes for the car at night.

One of the transient garage order forms used by the Grinnell Electric Car Co. is shown herewith. When an outside car wishes care at the station, this tag is attached to the car. Besides the time of receipt, owner's name and time the car is wanted, the repairs to be made are checked so that the garage men know exactly what to do. Nothing save what is checked is done except on notification to the owner before the work is done. Opposite the items, space is left for the charges to be entered.

This tag applies only to minor repairs such as the service station can perform. When real damage caused by accident or breakage is to be taken care of, the form shown in Fig. 2 is used. This is self explanatory and gives a complete record of what was done, the material used and the cost. The time is also recorded on this sheet, together with complete identification of the car. Such forms are necessary in a large plant and serve as undisputable records of major repair work. Since the Grinnell factory is also in Detroit, these larger jobs are done there.

Some Recent Rulings of the Courts—By George F. Kaiser

IN South Carolina an automobile while being driven along a public road ran into a rope stretched across the highway at a dark place in the woods to cut off part of the road which was being repaired, but it was at such a distance from the part of the road which was torn up that it was not likely that anyone would look for a rope across the road at that point. No light or sign or notice of any kind had been posted to show it was there and it was stretched at such a height that it was not easily seen. When the car collided with the rope its occupant was injured and she started suit against the county and recovered $1,000 damages. The county appealed the case and the Appellate Court affirmed the judgment, holding that the county did not use ordinary prudence in placing a rope in a dark spot without any other warning to show that part of the highway was being repaired.—Latimer vs. Anderson County, 78 S. E. 879.

Court Accepts Expert Advice

The right of automobile experts familiar with values to give evidence as to the value of an automobile was sustained in a recent case in Minnesota.

The plaintiff had purchased the car and after using it 4 days had an accident. The testimony showed that the machine could have been made as good as new. The owner of the garage where the car was kept was in debt to the defendant and when the latter made a demand for payment the garage gave the plaintiff's car in part payment. When plaintiff demanded its return it was refused and an action was started and $1,250 recovered.

The Court held that people engaged in the automobile business were competent to testify both as to the original cost price of the car and its value at the time it was converted from the plaintiff.—Schall vs. Northland Motor Car Co.—143 N. W. 357.

Accident in Rented Car

In the Supreme Court of New Jersey an action was recently brought against a company which rents automobiles. A man had hired a five-passenger car from the company which also provided the chauffeur. He invited a guest to ride with him. The driver negligently tried to crowd the car between a standing truck and the curb. A collision resulted and the guest was injured. He immediately brought suit against the company and recovered judgment against it as, the Court held, that the company renting the car might reasonably expect the man hiring it to invite someone to ride with him and the failure of the driver to use reasonable care rendered the company liable.—Rodenburg vs. Clinton Auto & Garage Co., 387 Atl. 71 (Supreme Court, New Jersey, June 11, 1913).

Fenders Have Two Objects—How To Attain Them

(*Continued from page* 547)

in the old style fender the mud would shoot out sideways. No matter from what direction mud may be thrown it is deflected towards the ground because the interior of our fender is perfectly smooth. There is nothing the mud can cling to inside the fender. Any mud that strikes the body of a Chalmers car is the spray thrown up from the bottom of the wheel and drawn back against the side by the vacuum caused while the car is in motion.

Shields Between Fender and Frame

We have also given a great deal of attention to the matter of dust and mud shields between the fender and the frame. This shield is made an integral part of the fender proper and it fits without any opening to the frame. Between the running board and the frame we have also provided a dust and mud shield. In front of the radiator is a shield which is fastened to the bottom and the front of the radiator. It is possible to drive the new Chalmers through exceptionally muddy roads without getting mud into the radiator. In our own tests the radiator has never become plugged up, causing the motor to overheat, as is a very common occurrence on cars which are not so well protected.

The power plant of the Chalmers six is thoroughly protected from dirt by the extension of an aluminum web from the crankcase to the frame. It is impossible for mud or water to come from the road up through this web. There is no opening for it to enter, and the only way that any dirt can reach the motor is through the radiator and that at the worst can only be a fine spray thrown out ahead of the car and blown back through the radiator openings. In this way we protect our car from dirt, both inside and out.

Entire Car Has Been Made Smooth

In addition to this the entire car has been made smooth with a view to eliminating dust and mud catchers. All doors are fitted closely while moldings are hidden. Such things as sidelamps, horn, door handles are difficult to clean and have, therefore, been abolished. We have gone beyond the matter of fenders and splash aprons in making the car easy to clean and have removed all possible projections which might gather dirt and mud.—Lee Anderson, Chalmers Motor Co.

Buffalo Electrics Are Fitted with Foot Control

Hinged Motor Is Unit with Rear Axle—No Universals in Drive

THE line of Buffalo passenger electrics comprises three models; the coupé, Fig. 1, seating four, with the two seats facing each other; the two-passenger roadster and the brougham. This latter model is not illustrated, but its appearance follows much on the lines of the coupé, except that the body portion is larger to allow for the difference in the seating arrangement. In this model instead of the passengers sitting facing each other the forward seats are arranged, one for the driver, and therefore permanently facing forward, and the other of the swivel type, enabling the passenger either to look ahead or face the occupants of the rear seat.

All three models are mounted on the same chassis which has not undergone any alteration during the past year. The drive is direct to the differential on the rear axle so that only a single gear reduction is made. The arrangement of the motor with its driveshaft casing rigidly bolted to the forward flange of the differential casing is shown clearly in the plan, Fig. 2.

The motor is suspended by the 3-point principle on trunnions mounted on a strong tubular cross member situated practically in line with the front end of the rear springs. This permits the necessary radial action.

A Diehl motor, specially designed for this chassis, is used. It is of the four-pole type with a totally inclosed cylindrical casing. The armature shaft runs on ball bearings.

The controller is of the barrel type operated by a short hand lever situated at the side of the driving seat. In addition, there is included in the electrical control system a pedal-operated switch which is one of the principal features of Buffalo Electric design. The pedal in connection with this switch also applies the service brake, and it is this duality of function of an important control member which simplifies considerably the driving of these vehicles.

Both the service and emergency brakes operate on the rear axle, the former being of the external contracting type and the latter internal expanding. The pedals for these brakes are the only control members for the feet and since one of them also acts in the capacity of controller of the three-point regulating switch as mentioned above, the car can be driven with both hands free for steering purposes, stopping and starting being accomplished solely by the feet.

The hand lever, which acts as a master controller need only

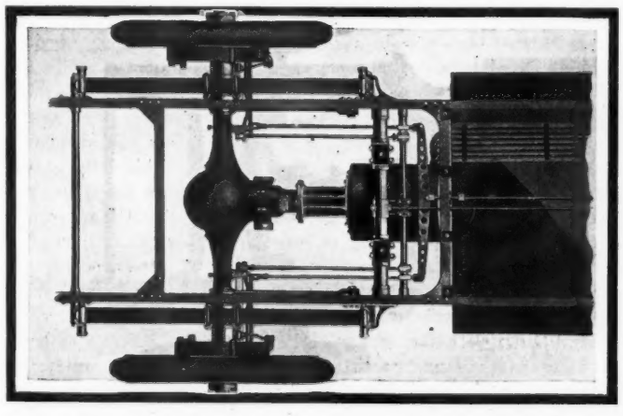


Fig. 2—Plan of Buffalo electric chassis, showing hinged motor support and solid connection to rear axle

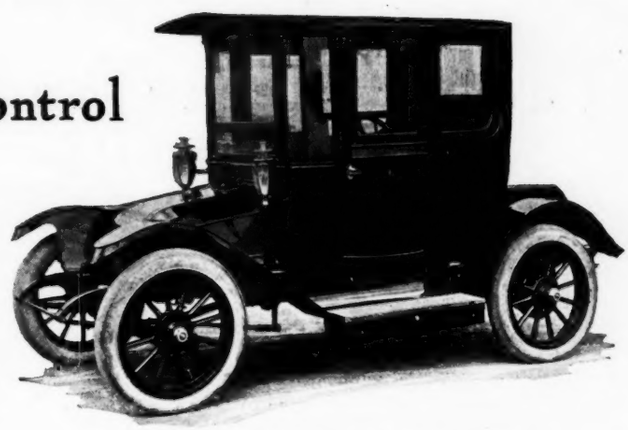


Fig. 1—Buffalo electric coupé for four passengers

be touched occasionally in driving. It is provided with five notches forward and one reverse. But the essential feature of the control is that in whatever position the hand lever is stationed, application of the service brake pedal cuts out the motor circuit entirely.

Starting and stopping are simple operations as follows: First, the service brake pedal is depressed, thereby fully applying the brake. Then the control handle is set to a convenient speed, the second notch, representing approximately 15 miles per hour, being advised. The car will then start by simply raising the foot slowly. This action first releases the brake, then passes through a neutral point into the first contact of the switch when the motor current passes through the whole of the special starting resistances. Further releasing of the pedal gradually cuts out the steps of this resistance until the car is running on the full current allowed by the particular notch on the hand lever quadrant.

Only Pedal Used for Stopping

In stopping, the control lever can be entirely forgotten. It is only necessary to apply the brake. Having brought the car to a standstill by this means, the lever is moved back to neutral, cutting off all current. The second pedal, actuating the emergency brake is then depressed and locked by the trigger at the toe, when the service brake can be released, and the car left standing.

The special foot-control switch is of the sliding brush type with a magnetic blow-out device fitted on the final contact. This is necessary as the final contact breaks the entire circuit before the brake comes into operation. The spark that would otherwise occur on breaking the current would have a tendency to burn up the edges of the contact piece and the copper brush. By fitting the magnetic blow-out this sparking is impossible and the switch therefore requires scarcely any attention.

Wheel steer is meeting with increasing favor. In the Buffalo models, wheel or lever steer is optional except in the roadster for which the wheel is standard. Both methods are of the irreversible type.

The standard battery equipment is forty-two Philadelphia fifteen-plate cells. This applies to all models. The mileage obtained naturally differs both with the driving and the load carried in the three models, but 75 miles per charge is a fair average on a carefully driven vehicle.

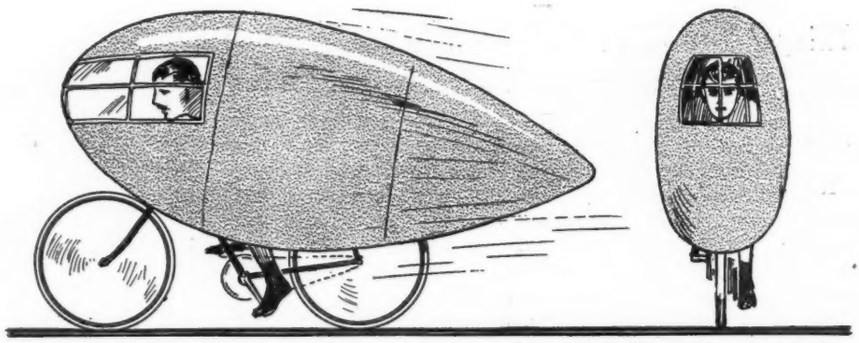
Further details of the chassis are as follows: The bearings are Timken throughout. The springs are semi-elliptics, the front 40-inch and the rear 46-inch. The wheelbase and tread are respectively 100 inches and 56 inches. Goodyear 34 by 4.5-inch tires are standard though solid tires are optional. The prices are: Roadster, $2,600; coupé, $2,900; brougham, $3,000.

Model 35 five-passenger brougham with a speed of 5 to 25 miles an hour has recently been added to the line. This sells for $3,200.

The Cyclecar and Wind Resistance

Use of Streamline Body—Trailing Vacuum Theory

By W. B. Stout



By streamlining a bicycle Berthet of France broke all bicycle speed records up to 3 miles, though carrying much added weight. This proved the importance of wind resistance, changed to skin-friction

IT will eventually be possible for the cyclecar to make as fast speed as present motorcycles, and with the same sized motors. This will be due to the adoption of the streamline body.

The performance of a cyclecar on the road, when it comes to final tests, will depend largely on the knowledge possessed by the designer of the car of the basic principles of aeronautics.

A large part of the future of the minimum-type cyclecar—the car giving maximum result for minimum upkeep—depends on aeronautical engineering and the reduction of wind resistance.

Wind Is Formidable To Cyclecar

In a big car with a 40-horsepower motor 15 or 20 horsepower can be used up in overcoming wind pressure—and often is—and still leave enough to drive with. In a cyclecar with a maximum 9-horsepower motor a 35-mile wind may mean running on low gear, unless the body is streamline.

Marcel Berthet, of Paris, fitting a heavy streamline body made of sticks and aeroplane fabric to an ordinary racing bicycle, recently went onto a track and broke all existing unpaced bicycle records between 2 and 5 kilometers—about 1¼ to 3 miles—traveling at an average speed of over 36 miles an hour. This proved at once that the added weight of the shaped body was more than made up for by power saved. The same principle can be applied to cyclecars.

In streamlining a body the contour of that body must have the shape of the vacuum hole left by the entering end. By shaping the front end of the body much of the direct head resistance can be changed to skin friction, which consumes but a very small fraction of the power. A square foot of head-on surface saved is worth a horsepower at 60 miles an hour, and that means but a 30-mile speed against a 30-mile wind, a frequent condition in America. The smaller the radius of the entering end the more head resistance can be changed to skin friction, but at that the front end of the car or moving form is the least important. It is the rear end shape that counts.

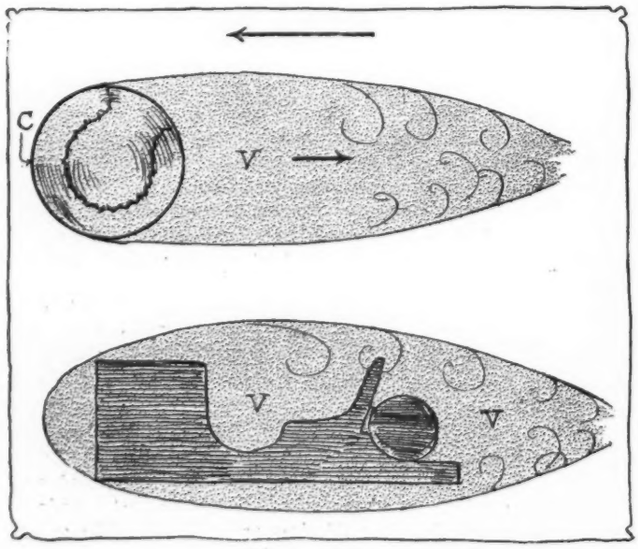


Fig. 1—True streamline shape formed by ball thrown through the air. V is the hindering vacuum

Fig. 2—Below, streamline vacuum about body of automobile

When you throw a ball through the air, as in Fig. 1, there is a small film of air compressed around the apex C as the ball advances, but only of small area. Along the sides the air slides past the surface, having but a small amount of resisting thrust, and, as it nears the periphery, increasing speed and decreasing thrust.

As the ball moves forward the air, thrust aside by the ball, cannot come together again back of the ball immediately, and hence just at the rear, as shown, there is a vacuum. This vacuum sucks the ball backward in the direction of the arrow in the wake, its force depending on the speed of the ball. This vacuum has a definite shape and forms a stream behind the ball of a certain shape. This shape is known as streamline. It will be seen from this that the term streamline, as used to describe the modern touring car body, which merely eliminates corners, is a misnomer.

Speed To Be Considered

Streamline shapes differ for different speeds, as the faster the object moves the greater will be the vacuum and the longer the tail behind, and the shape will be there, no matter what the shape of the body, in form, which theory can give almost exactly.

The writer, in connection with aviation work, studied very carefully the Deperdussin monoplane, which won the Gordon-Bennett speed race for aeroplanes at a speed of 105 miles per hour. On this machine every part was streamlined. If there was a round rod or tube exposed it had a wooden filler at the back, designed to fill the vacuum hole of the air stream behind the piece and cut to the theoretical curve of this hole at the speed the machine was supposed to travel. Where the stay wires fastened to the wings by steel clips about ⅛ inch thick there was a pocket formed in the wing to leave space for the compression point and to streamline the rear of the piece. Every item was considered, and the result was marvelous speed on small wing surface. The Frenchmen, it seemed to me, had gone to extremes.

At a later date the writer, in a boat over Lake Michigan, traveling with Glenn Martin, at a speed of over 75 miles per hour, attempted to point out to Martin where the McCormick hangers were located—the point for which we were flying. With my head ducked down safely behind the dash as far as possible

just to keep my eyes over the rim and follow the shore line a mile away, I lifted my hand above very foolishly and pointed inshore. Instantly the wind caught my hand as though I had thrust it into the water alongside a motor boat and threw it back almost into Martin's face—for this was a tandem-seater aeroplane. I turned in surprise to look at the pilot, who was laughing behind his face mask—and I then understood why he wore it and why the Frenchmen had completely streamlined their monoplane. Wind resistance at walking pace is some item on a windy day, especially if one carries an umbrella, and I have seen men crawl on their hands and knees on the sidewalk against a gale blowing off Lake Michigan, in order to make Michigan Avenue on a stormy night. The cyclecar with but 71-inch motor must recognize the wind as a real enemy and build bodies to eliminate all the wind resistance possible.

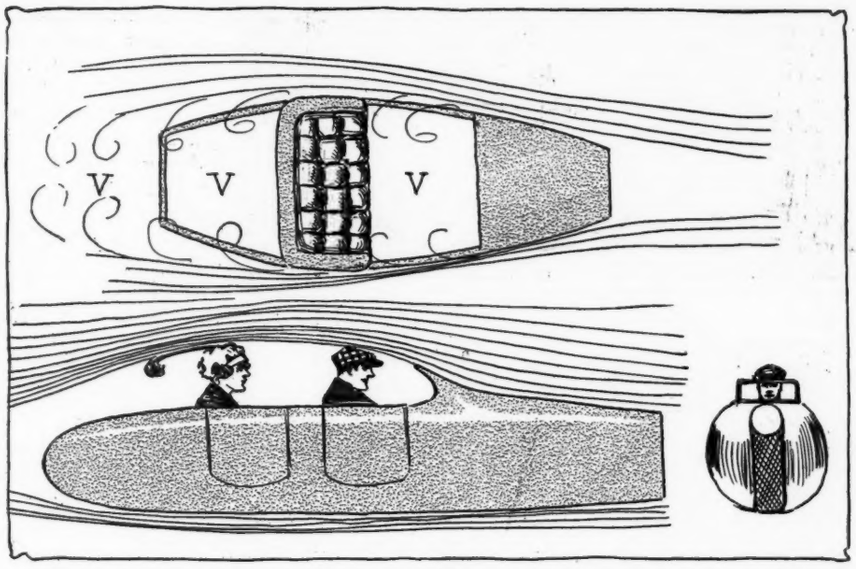


Fig. 3—The vacuum eddies formed in automobile as seen in the plan view. A flush side body would eliminate all but the rear vacuum

Fig. 4—Below, how a flush-sided tandem with tilted windshield takes the air in the car. This principle is used in racing aeroplanes

Fig. 2 shows how the motor car bucks the wind, the curves showing the eddies V of the vacuums formed, which take so much power. Though the front of the car is flat, the air cushions against it so that practically the front end streamlines itself into a hemispherical shape.

This shows, however, only the eddies seen from the side. Fig. 3 is a top view of the same. The resistance is in three places, the front one back of the dash, where the air sucks in from the sides, the second back of the seat, where it curves in around the rear surface, and the third at the rear end of the car.

If the body is fitted with sides of correct contour the eddies from the side around the hood and seat can be done away with, so that sides on a car can save considerable power. This is one advantage of tandem-seating cars, as well as the fact that narrowness and length allows of true streamline form bodies. In this type having high sides and with a slanting windshield, a shape very nearly approaching a true streamline form can be built, as in Fig. 4, the air current being shot over the heads of the riders with little tendency to eddies and vacuum in the intervening space, the air in the body remaining almost undisturbed.

Influence of Streamline Types

Having in mind the idea of changing head resistance to skin friction, of the importance of true streamline form for body design, and of the results obtained comparatively on a bicycle through streamlining the body of the man driving it, the basis of the statement at the head of this article is understood, and one now can see how a cyclecar may some day with the same sized motor equal if not surpass the speed of the present-day motorcycle. A four-wheeled car can be built with less head resistance than a motorcycle with a man on it. If this be the case, then the speeds should be at least equal, for the secret of speed is the conquering of wind resistance.

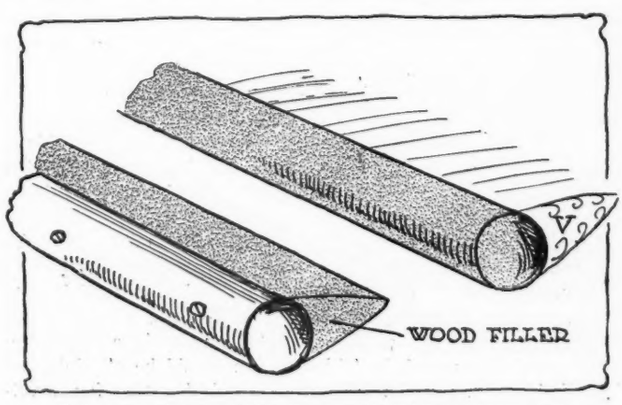


Fig. 5—For speed, tubes and axles can be streamlined

Morse Co. Brings Out a Tandem Cyclecar

A NEW cyclecar of very original construction is announced from Pittsburgh, this being built by the Morse Cyclecar Co., 520 Lang Ave. S.

This new machine is a tandem seating 36-inch tread car of long wheelbase, driven by a Spacke V motor and planetary gearset, and is novel in that the drive is to the front axle instead of the rear. The chain from the planetary gearset runs forward and drives a sprocket on a rigid front axle which is connected to the pivoted wheels by universal joint constructions so that steering action is allowed.

The car is said to be very fast and comfortable It is fitted with cantilever type springs front and rear and has brakes on the front wheels as well as the rear. The sides are very high, giving ample mud and dust protection and the seats roomy and very comfortable. The car is said to have all the comfort on rough country roads that the tandem cars are known to possess, it being claimed that the new vehicle's riding comfort is not surpassed by any big car.

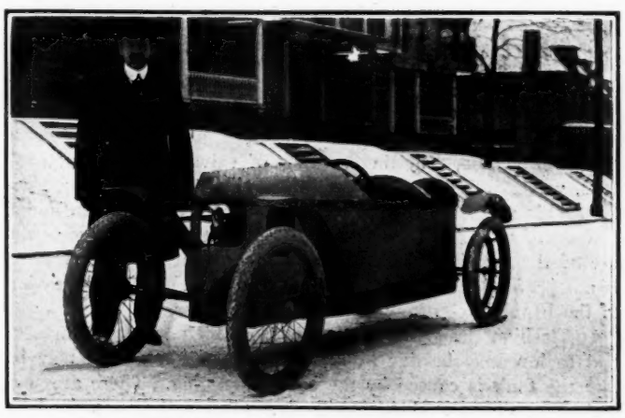
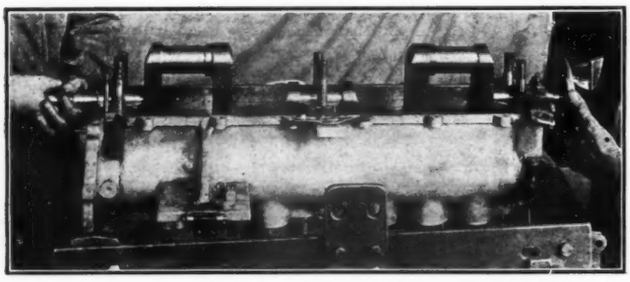


Fig. 6—Three-quarter front view of new Morse cyclecar



The Rostrum

How to Shift from High to Second

EDITOR THE AUTOMOBILE:—1—In a recent issue of THE AUTOMOBILE, an objection to an auxiliary exhaust was made because it required a separate camshaft. I am using a 1911 Franklin, and the auxiliary valve lifters are between the others and must be operated by the same camshaft. Am I right?

2—I am also using a Hudson 33, on which I can shift all the way from low to high very smoothly, but when I undertake to come back to second the gears clash, unless I come to nearly a stop. I have tried both the quick and slow shift with the same result. Can you give me some light? Is there good logic in H. F. B.'s letter in the Jan. 29 issue of THE AUTOMOBILE?

3—There seems to be a superstition with the average motorist that there is danger in cranking on the battery, but no danger on the magneto. Now as a matter of fact, with the spark lever in any position will not the spark occur at the same time on battery or magneto, and if the same speed is used on both in turning over the motor, how can a back kick result sooner from one than the other?

4—Is it not impossible for a motor properly timed to reverse in cranking with the spark fully retarded? I push down on mine for ease sake, and am whole yet.

5—Which is supposed to be the best for good results and economy, automatic control of spark by governors or hand control by lever on steering wheel, the usual way?

I am using governor on Franklin and lever on Hudson, and I have found that the Hudson gives best results with spark fully advanced at all times, unless pulling on grade or heavy roads. Now if I had governor control the spark would advance according to speed and when running on good level roads, say at 15 miles per hour, the spark would be too late for best results, besides the tendency to overheat, so I am wondering if after all the governor is an improvement. I am not making comparison of cars, as both are entirely satisfactory.

Daytona, Fla. SUBSCRIBER.

—1—The use of the auxiliary exhaust does not necessary require separate camshafts, but it does mean a great deal of extra complication caused by the extra set of valves. Four more push rods, valves, valve springs, etc., are required with this construction. This means four more valves to grind and also an added amount of noise. There are no great objections of course to the use of the auxiliary exhaust but it seems that this construction is not preferable and this impression is borne out by the action of the Franklin company in abandoning its use.

2—Clashing the gears in coming from high to second or second to low may be due to lack of care or skill, or it may be that the fault is caused by the clutch dragging. There are several good ways of shifting silently. One is that described by H. F. B. and another is that by A. F. L. in the February 19 issue. H. F. B.'s suggestion, which was to hold down the accelerator pedal when a shift is to be made and then accelerate the motor and driven member of the clutchshaft by slipping the clutch, the shift to be made when this member of the clutch has reached the speed required by the lower gear, has been tried by us and been found very satisfactory. A. F. L.'s method is also very good, although whether it is superior to H. F. B.'s is a matter of personal taste. A. F. L.'s method is to first bring the gear engaged to neutral without releasing the clutch, then the motor is speeded up to the speed required by the lower gear, the clutch pushed out, and this gear is engaged. The movement of the gear to neutral without throwing out clutch is accomplished by taking the load off the motor by removing the foot from the accelerator pedal. It will be found with a little practice that, with the use of either method, the speed of the motor can be gauged accurately enough to produce silent shifting.

3—It is a fact that with a given setting of the spark lever there is less danger of a back kick when the switch is set for the magneto than when the cranking is done on the battery. Your statement that for a given position of the spark lever a spark occurs at the same time whether the magneto or the battery is used is approximately correct providing that the motor is running at a reasonable speed. At 300 or 400 revolutions per minute, the sparks occur at practically the same time with either system, but this is not so when the motor is turned over by hand. When the motor is cranked on the magneto, its rotational speed is so low that a very weak spark is generated, with the result that the spark not only occurs a little bit later but also on account of it being weaker, it does not ignite the gas quite so readily.

But this is not the only reason why there is little danger of back kick when the motor is cranked on the magneto with the spark advanced. You have probably noticed that most men when they crank a motor on the magneto spin it as rapidly as possible, yet when they use the battery, they give it a quarter turn at a time, and this at a comparatively slow rate. The result is that when the motor is cranked on the magneto, quite a little momentum is stored up in the flywheel and this is enough in most cases to carry the reciprocating parts past dead center even if the spark should occur somewhat before dead center. In other words the feeble impulse of the first explosion is not sufficient to overcome the momentum of the flywheel. It is quite possible with maximum advance to obtain a back kick on the magneto providing the magneto generates a very hot spark at low speeds so that the motor can be started by spinning it very slowly. It is safe, however, to conclude that with the spark advanced nearly all the way, there is no danger of a back kick providing the motor is turned over at a rapid rate.

4—It is possible for a motor to kick back when it is supposed to be properly timed and when the spark is fully retarded. The driving gear of the magneto might slip, although this is hardly probable, so that the magneto might be thrown out of time enough to produce a back kick. Another possibility is that the linkage connecting the spark lever with the advance on the magneto breaker box or timer might slip, so that when the spark lever was retarded preliminary to cranking it would not retard the spark as it should.

A short-circuit in the primary system might cause the generation of a spark on the compression stroke and this would result in a back kick. Of course, the chances of any of these things happening are very small but at the same time the result of a back kick is often so serious that it is inadvisable to push down on the crank when turning the motor over.

5—The automatic advance is somewhat preferable when the car is in the hands of an inexperienced driver, but for a man who understands his car, the manual method of control has its advantages over the other system. For instance, assume a car is travelling 15 miles an hour. With automatic advance the spark would be retarded. This position would be all right for hill climbing but would not be an economical setting for traveling along the level. In other words, this position would be sat-

isfactory for the motor when the throttle was wide open but with the throttle nearly closed more power would be obtained by advancing the spark a large amount beyond this point, and this setting would not cause knocking because with the throttle nearly closed the amount of burnt gas in the cylinders together with the low compression would reduce the rate of flame propagation so much that the full force of the explosion would not come until upper dead center was reached.

Governor control should work as well on one car as another and therefore your suggestion that if this were applied to your Hudson car, the spark would occur too late is not quite correct, because as your magneto is now timed, it is too late.

To Prevent Patched Tubes from Splitting

Editor THE AUTOMOBILE:—I have had a great deal of trouble with tubes splitting next to the rim, and I have found that after patching or vulcanizing that the working of the tube will enlarge the crack until it extends out beyond the ends of the patch, and in this manner the tube becomes punctured again in a short time.

I found that by punching a hole at each end of the original split, Fig. 1, by means of an ordinary leather punch, that this trouble can be avoided. These holes prevent the split from extending further and yet they do not interfere with the application of the patch, nor do they weaken the tube.

Beatrice, Neb. J. G. NORCROSS.

Changing Touring Car to Truck Inadvisable

Editor THE AUTOMOBILE:—1—I have purchased a 1914 Overland which I expect to use as a passenger car. After its usefulness as a passenger car, I wish to convert it into a one-ton truck. Can such a change be made?

Louisville, Ky. A SUBSCRIBER.

—It is not advisable to change a touring car that is designed to carry a load of about 750 pounds into a 1-ton truck, for the reason that the changes that would be necessary in order to carry the extra weight would be prohibitive in their cost. The motor and gearset could be left the same, but all other parts would need to be replaced by heavier ones. A larger frame, heavier springs, axles and wheels and a lower gear ratio would be required and this would undoubtedly cost more than it would be worth.

You might use your touring car just as it is to carry a load of 750 pounds, but it would not do to put any more weight on it. If you cared to do this, it would be best to leave the car just as it is, as this is the load the chassis was designed for.

Motor Misses Occasionally

Editor THE AUTOMOBILE:—I have a truck that is giving me trouble. It will run all right for a while and then it will miss two or three explosions and then be all right again and so on. The valves seem to be all right. The trouble seems to be in the back cylinder. It is equipped with a Schebler model D carbureter and Remy magneto.

Vineland, N. J. W. J. EASTBURN.

—The first thing is to determine whether the missing is confined to certain cylinders or whether all the cylinders miss more or less. If the former is the case the ignition system or valve action must be at fault, while, if the missing is general, in all the cylinders, the trouble may be caused by improper carburetion or may be due to defective ignition.

Loosen up the wires running to the spark plugs and then test each cylinder in turn by running the motor with the other three wires disconnected. In this way you can determine what cylinders are missing. If you find that a certain cylinder is not exploding its charges, remove the spark plug and see if the porcelain is cracked, also note whether the end of the plug is badly sooted because if it is the current will travel over the surface of the soot instead of between the points. If the distance between the points is more than 1/32 of an inch, providing you are using magneto ignition or 3/64 of an inch if your truck is equipped with a battery alone, they should be adjusted until the gap is the proper width. Before this is done the points should be smoothed off with emery cloth if they are badly worn. If the trouble is not found here test the compression of the missing cylinders by opening the petcocks on the other three cylinders and then turn the motor over slowly. Lack of compression is a common cause of missing and may be due to several things. The valves may need grinding or the push rods may be out of adjustment, so that the valve is prevented from seating. It also would be well to inspect the high-tension wires running to the cylinders for defective insulation and also note whether the binding post nuts are screwed down tightly. After proceeding as outlined you should locate your trouble provided the miss is confined to certain cylinders.

If, however, all the cylinders seem to be operating irregularly, the trouble is probably with the magneto or carbureter. The most likely cause of trouble in the magneto is that the contact breaker points are out of adjustment or badly pitted. These should be smoothed off with emery cloth and set so that the gap between them is about 1/64 of an inch. This dimension varies somewhat with different makes of magnetos, so that it may be necessary to vary the gap a little one way or the other in order to make the motor run properly. If the points are set too far apart the motor will miss at slow speeds or may not run at all, while if the points are too near together it will miss at high speeds. This is the most common magneto trouble, but if after going this far the cause of the irregular firing in your motor has not been located, inspect the brushes to see that they are bearing properly. Note whether they are badly worn and whether the springs that hold them in place have proper tension. Dirt in the magneto or weak magnets might also make the motor miss.

Inspect the carburetion system for a sticking auxiliary air valve or float, and for dirt in the carbureter or feed pipe. A sticking air valve might produce a temporary miss by furnishing either too much or too little air depending on where it stuck. Likewise the float valve by sticking might raise or lower the gasoline level sufficiently to prevent proper carburetion. Dirt might interfere with the flow of gasoline from the nozzle or through the feed pipe from the gasoline tank.

Questions on Eight-Cylinder Engines

Editor THE AUTOMOBILE:—1—On eight-cylinder engines do they use one or two carbureters? Do they use one or two magnetos?

2—Is there an American cyclecar that uses a two-cylinder water-cooled engine? If so, what company makes the engine?

Groveland, Mass. J. D. COBBAN.

—1—Eight-cylinder motors have been built with both one and two carbureters and magnetos. The first motors of this type were fitted with two magnetos, because at that time it was impossible to get a magneto for an eight-cylinder machine. The modern way, as exemplified by the eight-cylinder DeDion, is

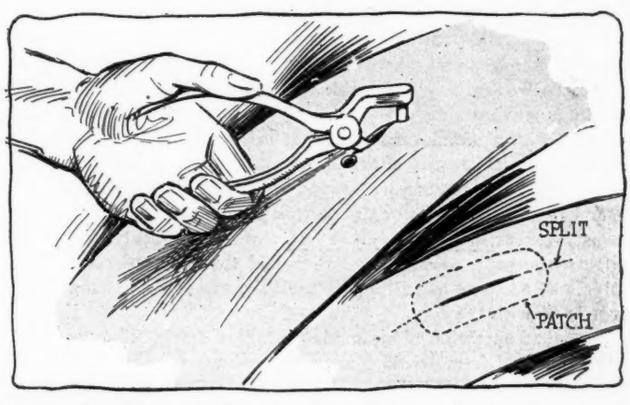


Fig. 1—Method of punching holes in split in tube to prevent the rent from enlarging

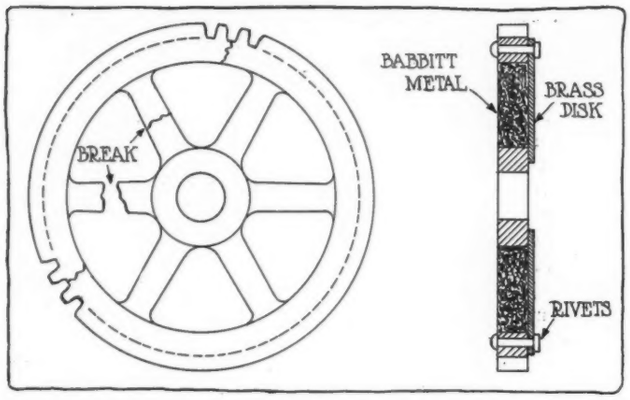


Fig. 2—How to repair a broken speedometer gear by the use of babbitt

to use one magneto, and one carbureter. In early eight-cylinder designs difficulty was also experienced in distributing the gas to the different cylinders, and therefore two carbureters were used, but with improvement in carbureter design and with a better understanding of the conditions affecting the distribution of gas to the cylinders, only one carbureter is now found necessary.

2—There is no concern in this country manufacturing a cyclecar equipped with a two-cylinder water-cooled motor.

Carbureter Float Is Gasoline Logged

Editor THE AUTOMOBILE:—Will you kindly tell me why the air intake on the carbureter of my 1911 E. M. F. gets full of gasoline at times? When the throttle is open it misses very badly.

Orleans, Ind. O. S. POLLARD.

—The filling of the air intake of your carbureter with gasoline is caused by too high a gasoline level, and this may be the result of several things. In the first place, there may be dirt under the float valve which prevents it from seating. It is also possible that the lever connecting the float with this valve has become bent so that the valve cannot close all the way. Or it may be that the carbureter float has become saturated with gasoline. In this case the float will of course be heavier than it was originally and the gasoline will be compelled to rise to a higher level in the float chamber in order to close the valve, or if it is very badly saturated it may not close the valve at all. If this seems to be the trouble, remove the float, and put it in a moderate oven for a few hours in order to expel all gasoline from the pores of the cork. When it has dried out thoroughly it should be given one or more coats of shellac to protect it from the gasoline. One coat may be sufficient but care should be taken to see that the cork is completely covered with a protective covering of shellac and therefore more than one may be found necessary.

Repairing a Speedometer Gear Wheel

Editor THE AUTOMOBILE:—I recently had to repair a broken speedometer gear wheel which was broken in about the manner indicated in Fig. 2. The break was clean, and a part of one of the arms was missing, but by placing the pieces together and tying around with a small cord the exact original form was obtained, save for the missing section.

However, the missing part made no difference. A speedometer gear has very little power to transmit and is not subject to shock to any extent, so I simply cut out a piece of sheet brass to fit against the gear, as shown. I then laid the gear on a horizontal table, melted some babbitt and poured the spaces full, as indicated, just level with the top.

Just that operation alone made the union fairly solid, and perhaps it would have worked all right without further refinement, but to make sure that there would be no breakage from ordinary usage in the future I riveted the brass plate onto the gear with small pin rivets, as indicated.

The gear looks a little strange now, but, being out of sight, this is not objectionable.

New York City. W. F. S.

How Oil Is Affected by Cold

Editor THE AUTOMOBILE:—1—Will the lubricating qualities of an oil be affected by keeping it in a cool room?

2—What is meant by piston speed?

3—What is the most common gear ratio of a racing car?

4—What is the A. L. A. M. horsepower formula?

5—What is the effect of using different spark-plugs?

6—How can carbon cause a knock in a motor?

7—Would it change the speedometer and odometer reading by using over-size tires and how much, if any?

8—Could I get different tones from a Klaxon by using different wires?

Cleveland, O. THOMAS BROWN.

—1—Oil is not affected by keeping it in a room where the temperature is low. For the time being of course the oil is much thicker, but as soon as it is warmed up to normal temperature it is exactly the same in its physical properties as before it was exposed to the cold.

2—By piston speed is meant the number of feet the piston actually travels per minute and this is equal to twice the stroke measured in feet, times the number of revolutions per minute the motor makes. For instance with a motor with a 6-inch stroke, in one revolution, the piston travels 6 inches downward and 6 inches upward, or 1 foot in all. Now, if the motor made 1,000 revolutions per minute, the piston speed of this motor would be 1,000 feet per minute. Piston speed is the average rate at which the piston travels. When the piston is in the middle of the stroke its speed is much greater than this value, while at the end of the stroke it stops momentarily.

3—The common gear ratio now used on racing cars varies from 2 to 2.5 to 1. The Peugeot that won the Indianapolis for example was geared 2.25 to 1.

4—The A. L. A. M. formula, now better known as the S. A. E. formula, is as follows:

$$\text{H. P.} = \frac{D^2N}{2.5}$$

Where D equals the cylinder diameter in inches and N equals the number of cylinders.

5—There should be no difference in using different spark-plugs in the same motor providing the spark-plugs are in good condition and the points the same distance apart.

6—Carbon deposits in the cylinders will cause the motor to knock because some of the small particles will become incandescent and remain so throughout the cycle, with the result that sometime on the compression stroke they ignite the charge. Thus the explosion occurs before dead center and tends to rotate the crankshaft in the opposite direction to which it is going and this produces a pound.

7—If you use oversize tires you should also change the gears on the speedometer drive to correspond, if you want an accurate instrument. The change in the speedometer reading when an oversized tire is fitted is about 3 per cent. less on the average. For instance, with the car equipped with 34 by 4 inch tires, the oversize tires are 35 by 4.5. The ratio of the two diameters represents the difference in the number of revolutions the wheels will make in traversing a given distance. In other words the larger tire will cause the speedometer to register about 97 per cent. as much as it did before.

8—Changing the size of the wires will not affect the tone of the Klaxon horn.

Dendy-Marshall Horsepower Formula

Editor THE AUTOMOBILE:—On page 270 of the issue for January 22, 1914 "A Reader" asks for information regarding the "Marshall and Denby" horsepower formula. He undoubtedly

refers to the formula which Mr. Dendy-Marshall and I devised independently in December 1906.

The formula is stated as follows:

$$\text{h.p.} = \frac{D^2SNR}{12000}$$

In this expression D = bore, S = stroke, N = number of cylinders, R = number of revolutions per minute. If one desires the power developed at 1000 revolutions the formula becomes simply

$$\frac{D^2SN}{12}$$

The formula is derived as follows: The horsepower of a double acting single cylinder steam engine is measured by the expression

$$\text{h.p.} = \frac{PLAN}{33{,}000},$$

in which P=mean effective pressure in pounds per square inch, A=area of the piston in square inches,—hence PA is the total pressure upon the piston. L=length of stroke in feet, N=number of strokes per minute which, in a double acting steam engine, is twice the number of revolutions—hence LN is the distance in feet traveled by the piston in one minute.

In order to make this formula suitable for a gasoline engine L must be expressed in inches. A can be put in terms of the diameter namely,

$$\frac{\pi D^2}{4} = \frac{D^2}{1.273}$$

For N we substitute the number of revolutions and divide by 2 as we obtain a working stroke only every other revolution.

The formula now reads:

$$\frac{PLD^2R}{33{,}000 \times 12 \times 1.273 \times 2} = \frac{PLD^2R}{1{,}008{,}216}$$

In a gasoline engine the mean effective pressure is usually between 70 and 90 pounds per square inch. Splitting up the divisor of the expression in its latest form we have

$$\frac{PLD^2R}{84 \times 12 \times 1000}$$

approximately. That is to say if we assume a constant value for P of 84 pounds per square inch

$$\frac{LD^2R}{12000}$$

gives the horsepower of one cylinder. For a multi-cylinder engine the formula becomes

$$\frac{D^2SNR}{12000}$$

Paris, France. JOHN JAY IDE.

How to Stop Axle Hum

Editor THE AUTOMOBILE:—I would like to ask the following questions about the 1913 Cadillac:—

1—Is there any way I can stop the hum of the gears in the rear axle?

2—Why does the motor vibrate more at 35 than 45 miles per hour?

3—What is its maximum speed?

4—How could I fit a gasoline vaporizer?

5—When should I put on a vulcanizer, before or after it is heated?

6—The nickel plating is coming off my head lamps and windshield. What would you advise me to do?

Cleveland, O. OSCAR MARTIN.

—1—The hum of the gears in the rear axle of your car is caused by improper adjustment of the driving pinion. The probability is that this pinion does not mesh as closely with the large gear as it should. Adjustment is obtained by screwing up on a collar that acts on the thrust bearings that hold the pinion in place. This was described and illustrated in the December 18 issue of THE AUTOMOBILE.

2—There is no reason your motor should vibrate more at 35 miles an hour than at 45. It is possible that the motor seems to vibrate more at 35 when the car is running because the vibration of the body is less at this speed and therefore the vibration of the motor is more noticeable. At 45 miles an hour, although the vibration of the motor has increased, the vibration of the body has also increased so much that the vibration of the motor is not so noticeable. You can easily determine that the motor does vibrate more at 45 than at 35 by running it idle at what corresponds to these two speeds.

3—The speed of the Cadillac is about 50 miles an hour.

4—The installation of a gasoline primer is illustrated in Fig. 3. The one shown here is a simple type, consisting of a small receptacle for gasoline attached to the dash and a pipe running from the bottom of this tank to the intake manifold. A small valve controls the flow of gasoline. Before starting, the valve is opened a small amount and enough gasoline to supply a rich mixture is introduced into the manifold. As soon as the motor starts running the valve is closed and the supply shut off.

5—A vulcanizer may be applied either before or after it has become heated.

6—The peeling of the nickel plating from the windshield and lamps is due to an improper application of the nickel, and there is nothing that can be done to remedy this trouble. There are two courses that you might follow: either have these parts replated properly or else scour off what nickel now remains and use the natural brass finish of these parts.

Contact Points That Separate

In the Rostrum for December 4, 1913, on page 1065, it is stated that magneto and coil makers state that there are no successful devices for preventing the primary contact points from remaining together and running down the battery when the motor is not running.

This statement is confusing in that it does not specifically mention that this refers only to vibrating spark systems. Successful single spark systems such as the Atwater Kent and the Rhoades operate on a different principle and have their contact points always separated when the engine is not running. It is hence impossible to exhaust the battery with a system of this kind through leaving the switch turned on by accident. The single spark system, through its principle of operation, has the same intensity regardless of engine speed and therefore when cranking a motor equipped with such a system little effort is required.

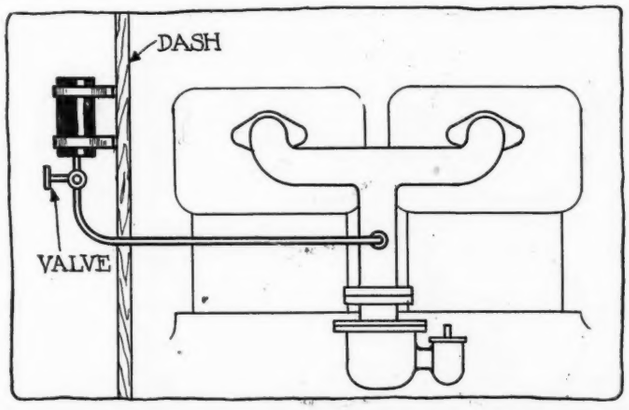


Fig. 3—Diagram showing the installation of a gasoline primer. A tank on the dash supplies fuel for starting directly to the intake manifold, the flow being regulated by a valve at the bottom of the tank

The Engineering Digest

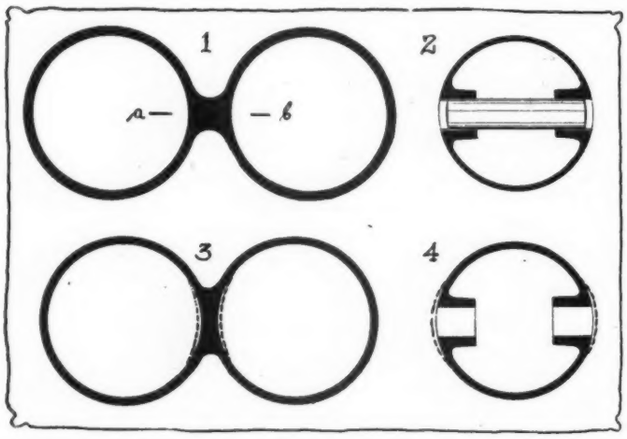
The Design of Pistons and Piston Pins with Main Reference to Expansions, Wear, Weights and Fit

DATA FOR DECIDING HOW PINS SHOULD BE SHAPED AND SECURED IN DIFFERENT CASES

THROUGH the successful efforts of aviation motor designers it has been shown that considerable more may be done to lighten the reciprocating parts of gasoline motors than has generally been considered necessary or desirable in the automobile industry.

In the following, the question of weights is, however, brought to attention mainly by the suggestions furnished incidentally by means of the illustrations. An equally important feature relates to the method for securing the piston pin and its influence upon the temperature and circularity of the piston. The reduction of piston diameter toward its lower end is a well-known expedient which is indispensable, as the play between piston and cylinder must be chosen as small as the danger of seizing or detrition will permit. This play is smaller for small pistons than for large ones. A formation which makes seizing more liable to occur is that shown in Fig. 1, representing a pair of cylinders cast with a connecting web. The convection of heat is considerably less effective along the plane a—b than at other portions of the cylinder walls, and as the piston pins are located in just this plane, the influence upon the expansion of the adjacent portions of the piston are unfavorable. A web in this place should therefore be made as thin as practicable.

As the heat of the piston is naturally communicated to the piston pin, the latter also tends to expand. On the supposition that it is a cylindrical pin firmly secured in the two hubs of the piston, either by means of a cotter on each side or simply by a close fit made tighter by expansion, the longitudinal expansion of the pin has a tendency to deform the piston in the manner indicated in Fig. 2. This effect cannot be obviated by having the pin come through at a lower level on the piston, as its position is determined by the necessity of having the lateral pressures of the piston against the cylinder walls as uniformly distributed as possible. Some details of the expansions which may take place are of interest. Assume the diameter of the piston to be 100 millimeters. The coefficient of linear expansion for cast iron at moderate temperatures is .001067 for 100 degrees centigrade. Say that the piston at the level of the pin is 200 degrees hotter than when not in operation. The expansion of the circumference of the piston at this zone can then be figured from the standard formula, by which expansion equals the product of the coefficient (for 1 degree), the original linear extension (in this case 100 millimeters multiplied by 3.14) and the number of degrees the temperature has been increased, and is found to be about .67 millimeter. To this lengthening of the circumference of the piston there corresponds an increase of diameter of about .2 millimeter. The diameter of the cylinder consequently need not be .2 millimeter larger than that of the piston, as it is also expanded.



Figs. 1-4—Illustrating deformations of pistons and cylinders

The length of the piston pin may be taken as 95 millimeters, as it does not come quite flush with the circumference of the piston. The expansion coefficient for hardened steel is .001240 for 100 degrees. If the temperature of the pin is also raised 200 degrees, the length of it is thus increased .00248 x 95 or about .24 millimeter.

This increase being slightly higher than that of the piston diameter, it follows that, under the conditions for securing the pin which were assumed, a deformation affecting the circularity of the piston circumference will be the result. In other words, the piston becomes oval.

Advantage of Case-Hardened Pin

The example here given may not fit all cases. If a case-hardened piston pin is used, its coefficient of expansion will generally be considerable smaller than that applying to steel hardened throughout, and the expansion of the pin will then not be greater than that of the piston diameter. The possibility of deformation on the grounds mentioned is to be kept in mind, however, in connection with other unfavorable conditions referred to in the following.

Causes of Deformation

In former days it was noticed that pistons in steam engines were in some cases worn away in spots, and some time elapsed before it was observed that the worn places corresponded to accumulations of material on the outside of cylinders. Such material caused, by its expansion, a raised place on the inside of the cylinder wall, and the piston rubbed against it. The same trouble arises with two cylinders which lie too close to each other, as in Fig. 3, where the relatively large mass of cast iron along the line of contact changes the form of the interior cylinder walls in the manner shown by the dotted curves, though the proportions are of course exaggerated in the drawing. This deformation can be aggravated by the bulging of the pistons in the same plane, in the manner indicated by dotted curves in Fig. 4, such bulging being caused by expansion of the metal of the hubs for the piston pin.

What is now being done to offset these effects of an uneven convection of the heat? In same cases the whole piston is made slightly oval by flattening it over the whole length of both sides. If this is found to be unnecessary, a place is flattened around each piston pin hub. If the pistons are not only turned but also ground, this flattening may be done conveniently by simply mounting them with the hubs sprung slightly apart, and, when the hubs spring back after the grinding is done, the piston surface

near them will be found to recede somewhat from the circular form.

The factors mentioned and the question of cost have led to many different designs of piston pins and many methods for securing them against turning and lateral displacement. When it is considered that a very small lateral misalignment of the piston pin can result in such detrition of cylinder walls that repair by grinding becomes impossible, involving a considerable loss in the case of a four-cylinder casting, and that pins and screws used for securing the piston pins have not infrequently found their way to the crankcasing, if an unsuitable method was employed, the choice of the design which is most suitable for the properties of the motor can never be unimportant.

The conical piston pin represents the best development but also higher cost of production, as compared with cylindrical pins. Fig. 5 shows a design which, according to all evidence, has proved suitable. The spline which prevents the pin from turning is secured by a brass disk ground to conform with the piston surface on the outside. It must be assumed that the coefficient of expansion for the material of the pin is so small as not to make the brass disk project. The mounting by this arrangement is simple. Fig. 6 shows the same system with a springy ring taking the place of the brass disk. The ring is lodged in a recess of the hub. In Fig. 7 a screw guards against both rotary and longitudinal misalignment, but the screw itself must be secured. On the other hand, expansions of the pin must be harmless, as expansion in one direction is unhindered.

Among designs with cylindrical pins, Fig. 8 shows one which is considered standard. A conical screw in each hub secures the pin's position. The pin has at each end an axial slit (which ends in a transverse boring to prevent further splitting), and when the screws are tightened the slit ends of the pin are wedged apart and a very firm seating is secured without resorting to a driving-fit. The latter is undesirable, as a finished light-weight piston is easily deformed or injured by pressure or blow from the side. With this construction, flattening of the piston to counteract expansions is probably in most instances advisable. The screws must be carefully secured by split-pins which are made to lean against the piston wall. Another method is to connect the two screws by a semi-circle of spring wire passing through transverse holes in the screws, but this wire might be subject to oscillations in the case of a high-speed motor.

A cheap and simple arrangement is shown in Fig. 9. A single screw has a conical portion which is screwed home in a conical bore in the piston pin, and it is secured by a spline in the longitudinal bore of the pin. Figs. 10, 11 and 12 show similar arrangements varying mainly by the means adopted for preventing the spline or split-pin from coming loose. By all of these methods the piston pin has free expansion in one direction if not fitted too tightly.

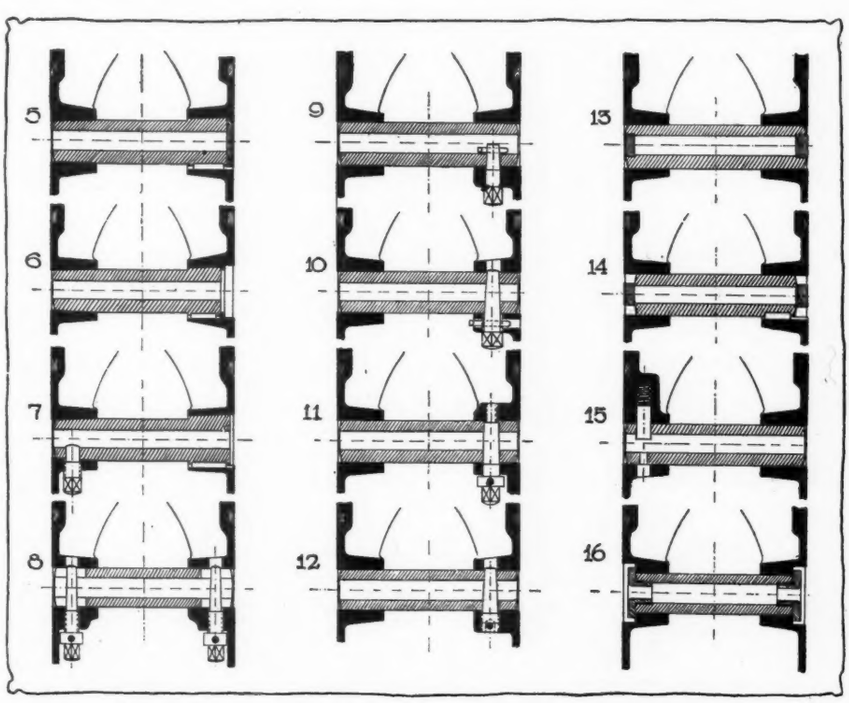
[The author shows also constructions in which the securing-screw comes through from the top of the piston, in view of making it easily accessible through a valve port. These are omitted here on account of the amount of metal they involve.—Ed.]

A design frequently used in American motors is represented in Fig. 13. A strong piston ring is laid around the piston at the level of the pin and also passes through recesses in both ends of the pin. A close fit of the ring in the groove on the piston is required to obviate skewing of the ring. Fig. 14 represents an improvement upon this design, by which the piston ring secures the pin only against longitudinal misalignment, while a spline functions against rotation.

The construction shown in Fig. 15 is cheap, secure and convenient. In the bore of a boss over one of the hubs a compression-spring is placed which presses a bolt into a transverse bore in the piston pin. Dismounting is effected by pushing the bolt back by means of a wire inserted in opposite bores in the pin and the hub, and then tapping the piston pin out endwise.

The design of Fig. 16 was formerly common in French cars. The heads of the screws at each end of the pin bore against circular shoulders in the hubs and were secured by a screw in each of the hubs, besides. The object was apparently to flatten the piston by turning the end-screws up as tightly as might be found necessary for this purpose.

Well-known firms now employ the construction shown in Fig. 17, in which the cylindrical piston pin is secured against both movements by a simple grubscrew. As the pin is case-hardened and ground, the portion where the screw-thread is cut must seemingly be left soft.



Figs. 5 to 16, 17 and 19—Different methods for securing piston pins

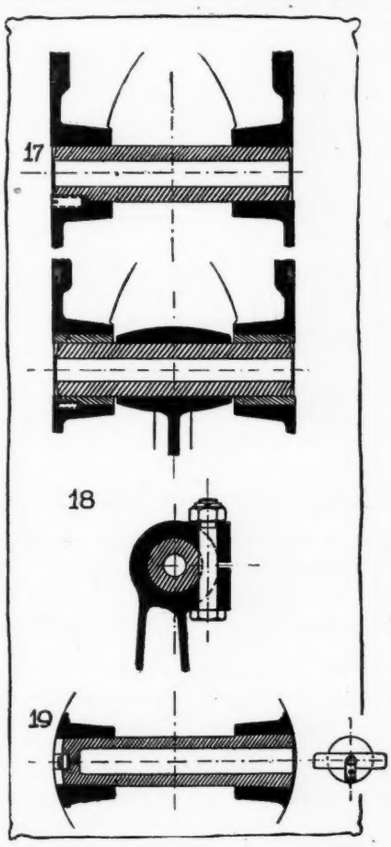


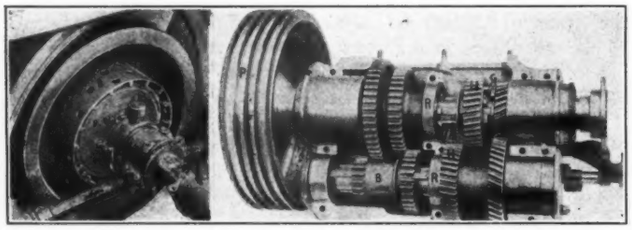
Fig. 18—Pin secured to connecting-rod

In the large majority of constructions the connecting-rod turns upon the pin and the latter is stationary, but in a few instances the pin is secured in the connecting-rod and the latter turns in bushings in the hubs. Fig. 18 shows a design of this type. The connecting-rod is slit and secured to the recessed piston pin by a cotter bolt. Expansion of the pin is here wholly without influence upon the circularity of the piston.

Fig. 19 shows a plan used for heavy motors. At the small end of the conical pin there is milled out a recess in which there is laid a yoke projecting into notches in the hubs. A small screw with a leaf spring interacting with a notch in the end of the piston pin secures the yoke.—From *Der Motorwagen*, February 10.

Dry Disk Clutch and Mitred Sliding Gear in Leading French Sixer

AMONG construction features departing from standard design in the six-cylinder 25-30-horsepower Delaunay-Belleville cars the most noticeable relate to the clutch, shown in Fig. 20, and the transmission gear, Fig. 21. The multiple-disk clutch is composed of sheet steel disks lined with thermoid washers and inserted in a cup secured to the flywheel. The cup is perforated to allow heat to escape and is provided with interior ribs which retain alternate disks. The action is dry, and



Figs. 20 and 21—Clutch and gears of Delaunay-Belleville Sixer

centrifugal action is depended upon to keep dust out. The minimizing of maintenance is the object in view. Two universals are used on the clutch shaft.

The characteristic of the transmission gear lies in the use of mitre gears for the third speed as well as for the reverse, with silence in view for the drives most frequently used. The difficulties which were encountered in the matter of getting a mitred gear to slide into engagement as easily as a straight one, especially in the case of the third speed, were overcome, it is said, only after prolonged experimentation. Other difficulties related to the end-thrust pressures created by the operation of these gears. Both the primary and the secondary shafts are supported at the middle by ball-bearings.—From *La Vie Automobile*, February 14.

Bugatti's Inverted ¾-Elliptic Spring for Roomy Light Cars

AMONG recent British patents Eric Walford finds one for a spring suspension taken out by Bugatti, whose leap to prominence among makers of light fast cars in Europe has caused widespread attention. The patent shows an improvement over the quarter-elliptic anchored to the extreme rear of the vehicle frame and reaching forward to the axle with which the Bugatti cars of 1914 model now in use are equipped and which is also used on small Peugeot cars under license, and it appears that Bugatti declares the more recent design to have been found quite superior. The accompanying illustration shows the new spring to be a semi-elliptic to the middle of which a forwardly-reaching quarter-elliptic is clipped.—From *The Automobile Engineer*, February.

[Aside from imparting to a car with short wheelbase the easy body movements which are normally obtained only by a longer wheelbase—which advantage it shares with the previous and better known type—the improved but more complicated spring seems to ensure an almost straight up-and-down movement of the axle, since the flexions of the two springs counteract each other with regard to the axle movement. Very little sliding motion in the universals will thus result from shocks, and brake action will also be more uniform. In addition it may perhaps be possible to obtain desirable effects by having the springs so proportioned that the oscillations of one break up those of the other. The special design of the semi-elliptic, which will make it flex into an S-shape, must be severe on the clip but apparently results in an efficient utilization of the amount of steel in it.—Ed.]

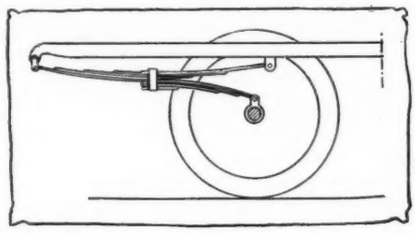


Fig. 22—New Bugatti spring for short wheelbases

New System for Keeping Voltage Constant Heralded from England

AN interesting new system for keeping the current delivered by a dynamo for lighting purposes in an automobile at a constant voltage, independently of the speed of the motor, is brought out by the Spiral Regulating Dynamo Company of London, England, and is illustrated in Figs. 23 and 24. The armature shaft is in the form of a sleeve riding upon a main shaft, in the surface of which there is cut a spiral groove of geometrically progressive pitch. A steel ball lodged in the spiral groove and at the same time in a straight groove in the hollow of the armature shaft maintains a driving-connection between these two shafts. The main shaft is driven, and if its speed is increased the armature tends to lag behind, owing to the increased magnetic pull between it and the pole pieces. The lagging is made possible by the nature of the driving-connection and therefore takes place, the armature shaft sliding along the main shaft against the resistance of a helical spring, and by this action the armature is withdrawn from its position in the magnetic field between the pole pieces. By suitably proportioning the strength of the spring and the pitch of the spiral groove, the effect of this lateral displacement of the armature with relation to the field can be so regulated that the actual number of lines of force cut by the armature windings during a given period of time is kept constant—this determining the voltage.

In addition to the main control, it is necessary at very low speeds to prevent the current from the battery from flowing through the armature coils and thus going to waste, as it has a tendency to do whenever the voltage of the battery current exceeds the voltage of the dynamo. To this end, whenever the motor speed falls off and the armature moves to the right, far enough, it engages a trigger attached to a movable contact piece and thereby causes it to slide out of engagement with the fixed contact piece, breaking the connection with the battery. On the other hand, when the armature moves to the left with increase of the motor speed, it is released from the trigger, a small spring forces the contacts together and the circuit is re-established. This cut-out switch arrangement is shown in Fig. 23.

With this system it has been shown that the lamps can be lighted directly from the dynamo, as may be desirable if the battery should fail. It is also claimed that the power consumed in running the dynamo is constant, since the magnetic torque is constant and no power is wasted in creating counter-currents at any motor speed.—From *The Auto*, February 14.

Principal Features in Design of Omnibuses with Electric Drive

THE early history of the automobile industry in the United States tells of a number of serious and costly efforts at perfecting the development of vehicles in which the power is transmitted electrically from an internal-combustion prime motor, but all these efforts were abandoned, mainly as a matter of commercial policy, the working-capital failing when it was seen that the manufacturers of France had succeeded in stampeding the general public all over the world for the now standard type, in which the transmission is purely mechanical. The void left in the American development has now become noticeable through a combination of circumstances: Motor starters have again called attention to the advantage of electric transmission with a battery reserve, electric equipment has become better, lighter and cheaper and promises much more in the same direction; the economy of gasoline motor trucks with mechanical drive has not been found equal to that of steam trucks in sizes above 3 1-2 tons capacity and, most of all, European experiments and actual practice with electric transmission have advanced the mixed type of vehicle beyond the stage it had reached, there or here, before it was first abandoned—about 1905-6.

Another curious void in the American development relates to the construction of motor omnibuses for public traffic. It is therefore perhaps more than a coincidence that one of the best examples of improved construction for gas-electric vehicles—and one which necessarily will be studied and to a certain extent imitated—comes in the form of an omnibus, or rather a number of omnibuses which are being used successfully in London and Birmingham, England. These are all equipped with the Tilling-Stevens power unit, and at the recent motor truck show at Manchester a 4-ton char-a-banc chassis was exhibited fitted with the same power plant. *The Engineer,* in the issue of February 6, containing a review of the show, briefly describes this power plant as follows:

The engine has four cylinders, 121 by 140 millimeters, capable of developing 40 horsepowers. The electrical transmission consists of a generator driven directly by the engine through a flexible coupling, a series-wound electric motor direct-coupled to the cardan shaft, and the controller box. The latter carries a reversing switch, and a shunt resistance for the generator fields is carried in a separate box, both boxes being mounted on the dash and operated by two small levers. The generator is capable of an output of from 1 to 30 kilowatts at speeds varying from 350 to 1400 revolutions per minute and the voltage varying from 0 to 300. It has been designed so that any increase in the demand for current when the engine is fully loaded is accompanied by a corresponding reduction of the voltage. The output in kilowatts at any speed is proportional to the power exerted by the engine, but the volts and amperes may vary over a large range according to the gradient, speed or degree of acceleration required.

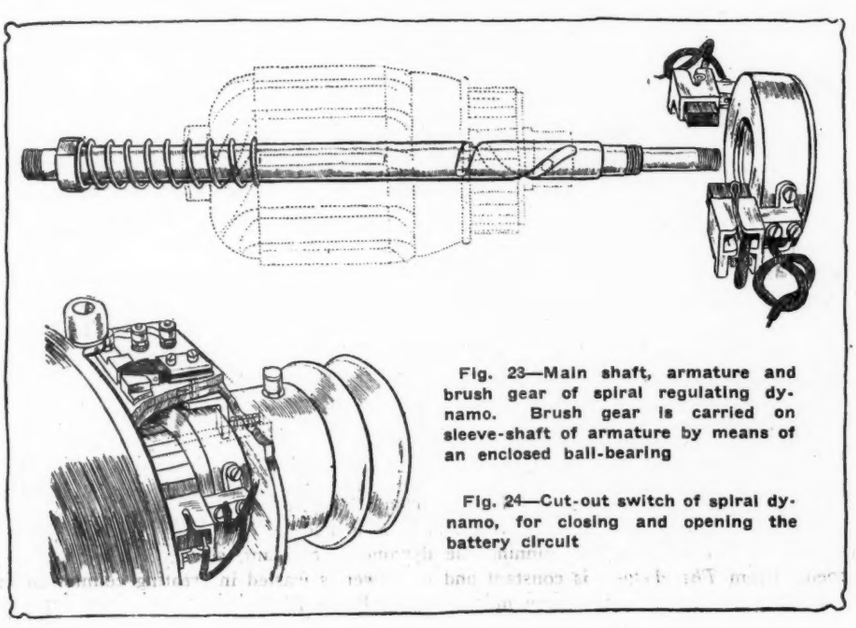


Fig. 23—Main shaft, armature and brush gear of spiral regulating dynamo. Brush gear is carried on sleeve-shaft of armature by means of an enclosed ball-bearing

Fig. 24—Cut-out switch of spiral dynamo, for closing and opening the battery circuit

Cast and Sheet Steel Wheels for Trucks Gaining in France

WHILE two years ago metallic wheels were practically considered out of the running in France, even for the heaviest motor trucks, Germany's example in making cast steel wheels compulsory for military trucks coupled with the gradual abandonment, for cause, of iron tires for all motor trucks in France, intended to run at speeds as high as 15 kilometers per hour or more, including the subsidized types constituting the military reserve equipment, has resulted in new provisions in this respect. One of the reasons for the slow action was that cast steel wheels were not made within the boundaries of France and that pressed or forged steel wheels, such as were and still are made at the Arbel establishment at Couzons—mainly devoted to the making of forged railway car and locomotive wheels—come very high, by reason of the cost of the matrices, unless a large number of the same model can be manufactured. Now, however, cast steel wheels are made at a number of places. *Le Poids Lourd* mentions the foundry at Suresne, the steel works at Firminy, the steel works of Saut du Tarn, the Chatillon-Commentry mill and the Quillet plant at Calais, and pressed steel wheels are turned out not only by Arbel but also at the steel works at Haumont. The latter concern made the wheels, for example, with which Bayard-Clément military trucks went through the trials of 1913.

The Sankey wheels, made from two pressed shapes autogenously welded along the middle plane of the wheel and already widely used in other countries for pleasure cars as well as for trucks, present technical advantages, relating to both quality and cost, which are likely to operate against the further growth of a pressed-steel wheel industry in France, unless the plan on which the Sankey wheels are made can be adopted. The field for cast steel wheels is more nearly free, and they may be able to compete with the welded wheels for heavy vehicles, as for these the metal is not required to be thinner than it can be cast. The cast steel wheels turned out at the renowned Fischer electro-metallurgical works at Schaffhausen, Switzerland, furnish the prototype upon which the new French cast wheels are modelled. This is especially true of Arbel cast wheels. The spokes are hollow and the rim is flat, while the steel, like the electric steel used in Fischer wheels, is so ductile that it is flattened without cracking under a drop-forge blow. If deformed by accident a wheel of such material can in some cases be restored. [In this connection it may be noted, however, that the most expensive grade of Fischer wheels has not only hollow spokes but also hollow rims.—Ed.]

The cast wheels turned out at Suresne have so far V-shaped spokes, and those made at Firminy have cruciform spokes, in both cases with a view to cheapness. These proved satisfactory for truck purposes at the 1913 trials.

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Power Not Piston Displacement

FOR the first time an American car has won the Grand Prix race in America, a race representing what has been generally accepted as the last word in high-speed road racing west of the Atlantic.

Last Saturday's race over the Santa Monica course, won by an American driver, Pullen, in an American car, the Mercer, has demonstrated that it is not the biggest motor that can always make the best performance in a 400-mile road race.

The Grand Prix race in America had its inception in speed. In those days to get speed was looked upon as synonymous with larger motors. The restriction of 600 cubic inches piston displacement was thrown aside. Speed meant a motor larger than 600 cubic inches.

Last Saturday has told a different story. The Mercer's performance on the Santa Monica course demonstrated that the days of the 600-cubic-inch race are over, as both the pace-setting Sunbeam and the winning Mercer came well under the 600 mark. The Sunbeam with not half this capacity was able to set a record-breaking pace and the Mercer coming well under the limit and not half so large as some other entrants, was able to win. These new leaves turned over last Saturday should make another chapter in the time-developing proof that power and speed are obtained from other factors than mere piston displacement.

The lesson of the race should be learned. The costly, heavy and wasteful large motor is doomed and the makers who are going too far should call a halt.

The New England Spirit

NEW ENGLAND stands for unanimity. There is a oneness among the six states that is sorely lacking among groups of states in other sections of the country, that lend themselves as readily to be grouped together much as the states constituting New England. True, historical associations, blood ties, etc., are doing much to build up and establish the esprit de corps of New England, yet business interests are also working together to the same end.

Motoring New England has annually been cemented together by the annual Boston show, which some years ago rivalled the national shows in importance, and today is a close rival so far as different exhibits and numbers are concerned, but which now stands as a dealers' territorial show. Instead of the Boston show it should be labelled the New England show. It is a show for dealers of the six states. This fact alone encourages every car builder and every accessory dealer to make as much as possible out of the Boston show as a retailing one.

There is not a dealer throughout New England, there is not a branch manager and there is not a garageman but who is well impressed with the one fact, namely, the New England, call it Boston or by any other name, show is from March 7 to 14. The unanimity of interests has heralded that fact from the Canadian line to the Atlantic and westward to the lines of New York state.

This spirit of unanimity is an underlying spirit of success in the business world of today. Co-operation is looked upon and reckoned as one of the foundation stones of business stability. Where co-operation does not exist it is rare that success is found. Any organization today that cannot co-operate with other organizations in the same field of business does not see the true boundary lines, has not yet realized the great circle of horizon that marks the confines of that particular industry. The compound eye of the fly plays too big a part in the makeup of such an individual or organization.

This is an age of co-operation and organization. If a few years ago some of our legislators failed to realize this the time is coming, if not at hand, when governments realize that co-operation means efficiency and stability rather than monopoly and extortion. The useless overhead has been one of the millstones around the necks of many industries and individual concerns. Co-operation has already eliminated much of this and will continue to do so.

Many other territorial sections of the country can copy to advantage the co-operative spirit of New England. Get together territorially and make a real organization, make a show so large that it stands shoulder high with the national ones so far as numbers and versatility of exhibits is concerned. Make it an exhibit worth while.

The machinery making for factories still remains strong, and if within the boundaries of the six states but a small percentage of the existing motor products are manufactured, it is true that the tools by which our most accurate parts are made, and the tools which make possible the enormous productions that have made our Detroits, our Toledos, our Flints and our Clevelands and our Indianapolises were produced in New England.

New England holds her status and her spirit of unanimity has strongly cemented her existing factors

Pullen Wins Grand Prix in Mercer—De Palma Vanderbilt in Mercedes

American-Made Car Winning Grand Prix for First Time Covers 403-Mile Course at 77.2 m.p.h.—Vanderbilt Winner Breaks Record—295 Miles at 75.5

LOS ANGELES, CAL., Feb. 28.—*Special Telegram.*—Those scoffers who have forecasted the end of motor racing were answered here today and Thursday when the Vanderbilt and Grand Prix classics were re-established as red letter items on the national sport calendar.

An attendance of close to 250,000 for the 2 days and zestful general interest showed that the full field of notable entries was appreciated.

Speed averages for both contests were topped, although no worlds records were excelled. Not a serious personal injury took place. Positions "in the money" for the leaders in the two whirls were aggressively disputed.

It was, all in all, a vindication for motor-car racing.

Also, it was an occasion of great pleasure for the Mercer camp, one of whose cars was the first American-made automobile to run away with the Grand Prix. The Mercer flag also whipped in the breeze in position No. 2 in the Vanderbilt.

The Mercer that ran over the 403.248 miles of the Grand Prix today at an average speed of 77.2 miles was boosted along by Edwin Pullen, a new hero for speed fans.

Duplicating the record of Harry Grant in the Alco, Signor Ralph De Palma and his trusty Mercedes flew through the Vanderbilt with well-known nonchalance—295 miles at 75.5 miles an hour. And his fine Italian hand never flickered, even though Barney Oldfield was "coming back" just 1 minute 20 seconds behind in the stretch. The rejuvenated Mr. Oldfield was in that other Mercer.

Both De Palma and Oldfield were in the same lap when the checkered flag was wig-wagged. Carlson in the Mason was third. Earl Cooper in the Stutz was fourth. A Touraine, running at the finish, was not allowed to cover the total distance.

De Palma had won the Vanderbilt in the old Schroeder Mercedes for the second consecutive time in the best mark ever made in the classic, the nearest approach being Mulford's Lozier, whose average was 74.07 miles an hour, in Savannah in 1911.

In the Grand Prix Pullen's average in the Mercer was nearly 3 miles per hour faster than the speed of the late Bruce-Brown, whose Fiat won the Grand Prix in Savannah in 1911 at 74.45. Pullen might have smashed the world record of 78.7 had he been willing to take a chance, but trouble with his front tires slowed him and left Tetzlaff owner of this bluest blue ribbon.

And also Wishart in his Mercer was moving right along at 84 miles per sixty minutes, 'way ahead of the field for a considerable distance. Alas, in burning up the track he burned out a necessary bearing. After giving the crowd $18.22 worth of thrills he had to retire quietly into the landscape.

How They Finished

Grand Prix

Car	Driver	Speed M.P.H.
Mercer	Pullen	77.2
Marmon	Ball	68.4
Alco	Taylor	65.6
Mercedes	De Palma	...

Vanderbilt Cup

Car	Driver	Speed M.P.H.
Mercedes	De Palma	75.5
Mercer	Oldfield	75.0
Mason	Carlson	72.7
Stutz	Cooper	72.3

Upper—Edwin Pullen, who won the Grand Prix in a Mercer
Lower—Ralph De Palma, who took Vanderbilt honors in a Mercedes

Hard Struggle

In the Grand Prix today the first three-quarters was most interesting with Wishart, De Palma, Anderson, Marquis and Pullen alternating in the lead, but the final test saw all eliminated but Pullen. The three who finished after him—Ball in the Marmon, Taylor in the Alco and De Palma in the Mercedes—simply limped home, there being more than 40 minutes' difference between first and second time.

Two accidents occurred, one in the Vanderbilt and the other today. In the former, Pullen went out of Death Curve after giving every indication that he would win, while today Marquis in the Sunbeam met a similar fate just after he had taken the lead and it seem impossible that any of those back of him could catch up. Pullen escaped without a scratch, while Marquis was bruised a bit, but escaped serious accident in a most miraculous manner.

Los Angeles Wants 1915 Races

At a dinner given this evening to the officials and drivers at the Los Angeles Athletic Club, the San Francisco Automobile Dealers' Association made a formal application for one of the classics. It is proposed to split the two races next year, permitting San Francisco to have one and Los Angeles the other. 'Frisco would like to have the Vanderbilt for the fall of 1915, leaving the Grand Prix to Los Angeles for next spring.

California sentiment is that Leon T. Shettler and his associates, for promoting

the Grand Prix and the Vanderbilt without relying on entry fees to make a profit, should be given large, fluffy crowns by the automobile industry.

Ed. Pullen, former mechanic for Spencer Wishart and whose first driving victory was achieved at Tacoma last year, to-day won the honor of piloting the first American car that ever won the Grand Prix. Pullen's time was 5:13:30, while the second car—Guy Ball in the old Marmon that Parzchke drove at Savannah 2 years ago—ran second in 5:53:23, an average of 68.4 miles per hour. Taylor in an Alco six was third in 6:08:29, averaging 65.06 miles per hour, while De Palma, limping in, took fourth and last money in 6:09:08. The only other car that was running was Gordon in a Mercer, a private entry, which finished forty laps when Referee Wagner stopped it. All the other thirteen cars had been eliminated for one reason or another.

The Nevada avenue turn on the course. This is called Death Curve

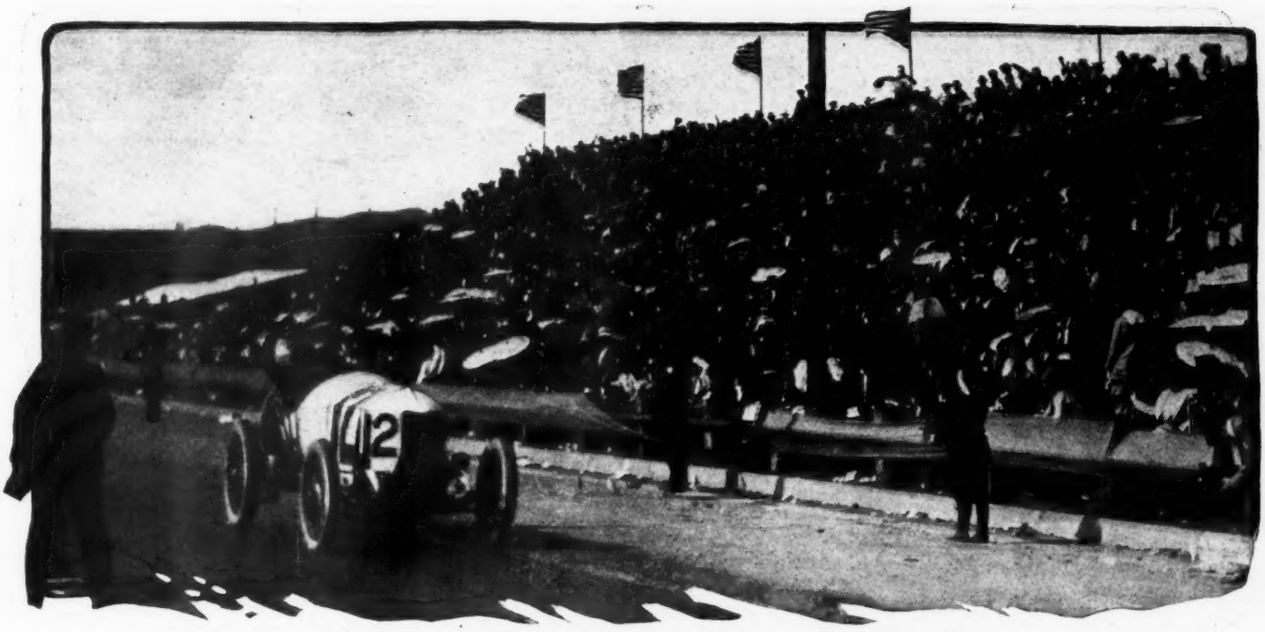
It was a most interesting race, was this Grand Prix, with four different drivers having the lead at one time or another, each of whom looked like a winner when he was in front. Spencer Wishart went out in front and he set a sizzling pace for the first twenty-two of thirty-eight laps. The first fifteen he had averaged 84.4 miles per hour and at twenty he had dropped to 83.6 miles per hour. Even then there was no indication that he would let up his dizzy speed, but in the twenty-third lap a burned-out bearing stopped him.

This gave De Palma his chance, and the man who had twice won the Vanderbilt stepped out in front and stayed there to the end of the twenty-ninth lap, although he dropped the average below 80 miles per hour. Then a broken intake valve stopped De Palma, who had gone through the Vanderbilt without a stop and who was in his thirtieth lap in the Grand Prix when trouble overtook him. But it was a serious trouble and prevented him from holding his place. A stop of 20 minutes was made at the pit while De Palma worked on his valve. Finally he had to go on in a crippled condition, running on three cylinders for the rest of the race, yet being able to pull down fourth money. Had he had an extra intake valve, he would have been a sure second and might have won the race itself.

Marquis Comes to the Front

When De Palma was stopped in this manner it left the field clear for Marquis in the English Sunbeam, which had not made a stop up to this time. The easy manner in which he slid around made him dangerous, and it looked all over but the shouting. But Marquis only stayed in front for three laps. He was more than 47 minutes ahead of the limping Mercedes when he met with the accident on the turn after leaving the grandstand. Some of the bystanders say it was caused by Marquis taking a hand off the steering wheel to wave to the crowd. At any rate, the Sunbeam turned over three times then landed end-on against a 7-foot fence. That Marquis and his mechanic were not killed is a marvel, but both escaped, although both went to the hospital. First it was reported Marquis was killed, but later it was stated

Line-up of the drivers before the start of the Vanderbilt Cup race on the Santa Monica course



De Palma receiving the flag at the finish of the Vanderbilt Cup race, having won at 75.5 miles an hour

he did not have a bone broken and would recover. The car was wrecked completely by the unfortunate accident.

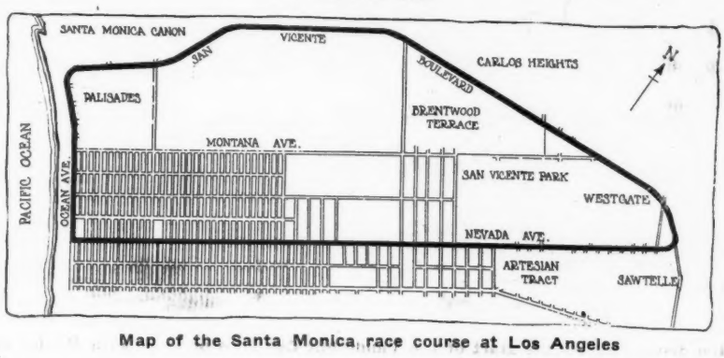
Pullen Takes the Lead

Pullen had been running along second and third most of the time, and when Marquis went out he was in a position to take advantage of De Palma's weakness and take the lead, which he never relinquished. The only one to fight him was Gil Anderson in the Stutz, who had been within gunshot of first place nearly all the way through the race. Gil ran second for eight laps, then stopped unexpectedly in the back stretch, no reason for his withdrawal being given.

Anderson's stopping in the 44th lap robbed the race of its last semblance for competition, for Ball and Taylor who finished 2 and 3 never were in the fight. It simply was a case of a couple of cripples limping home. De Palma, too, was in this same category, although earlier he had been a most important factor. Tetzlaff had been counted upon as a possible contender, but his giant Fiat could not stand the grueling grind and went out with a broken connecting rod that punched a hole in the crankcase after Teddy had gone seventeen laps. At that time he was in third place. Tetzlaff made the fastest lap in the race, 5:49 or 86.6 miles per hour in the 12th. In this same round Wishart turned 5:54, the second fastest of the race.

Pullen cannot claim a world's record, but he has the satisfaction of knowing that he covered thirty-five laps faster than did Tetzlaff when he put up his world's mark of 78.7 miles per hour. For this distance Pullen averaged 79.2 miles per hour. Tires caused him to slow after this. In all, the Grand Prix winner had eight stops. Four of these for tire changes and the rest were stops at pits for spares. At first stop at pits improved opportunity to take on gas and oil, the only time during the race. Ball Marmon had most of its trouble in a bunch. In the nineteenth lap 19 minutes elapsed, during which Ball put on new float in carbureter, changed three plugs, took on fuel and water, adjusted magneto mounting and plugged up a sand hole in water pump casting. Another time he used up 2 minutes changing a tire, and a third stop of 2 minutes was made to take water and gas.

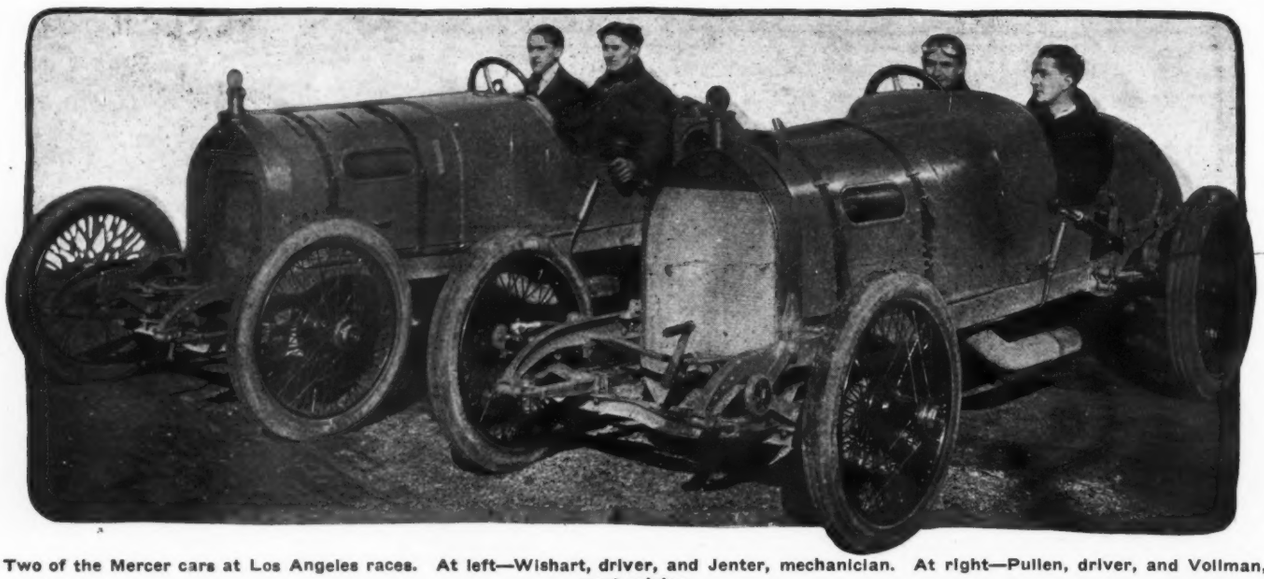
J. P. Marquis, who drove a speedy race in the Sunbeam until his car turned over



Map of the Santa Monica race course at Los Angeles

Taylor's Alco made four stops, three for tire change and one to take on supplies. Most of De Palma's trouble was over valves. If he could have avoided this he might have been a winner.

The pit took "pep" out of today's race and it didn't have the flash and flourish of the Vanderbilt. With the favorites one by one "eradicated" the tensity of the huge gallery began to lessen. Even the record time of Pullen didn't seem to stir the crowd. It is one thing to cheer for a De Palma and Cooper, *et al*, and another to cheer for a "dark-horse" Pullen—until he had won his spurs in the last lap. Then—wild jubilation.



Two of the Mercer cars at Los Angeles races. At left—Wishart, driver, and Jenter, mechanician. At right—Pullen, driver, and Vollman, mechanician

Going through list of casualties one finds following reason for withdrawals:

Tetzlaff, out in 18th, broken connecting rod.
Wishart, out in 23d, cracked cylinder.
Anderson, out in 45th, no reason given.
Carlson, did not start, broke crankshaft driving on course.
Cooper, out in 6th with broken valve.
Goode, out in 18th, broken pushrod guide.
Marquis, out in 23d, turned turtle.
Verbeck, out in 3d, broken valve.
Oldfield, out in 37th, burned out bearing.
Janette, out in 24th, broken cylinder.
Richenbacher, out in 34th, broken crankshaft.

De Palma's Judgment Won

De Palma's victory in the Vanderbilt on Thursday was largely due to the fine judgment and headwork he displayed. Driving a car much slower than those of the majority of his rivals, he was content to nurse the Mercedes along. His patience was rewarded. He saw competitor after competitor, who had reeled off faster laps than he, gradually eliminated. De Palma's fastest lap was turned in 6 minutes and 20 seconds and his slowest, the first, in 6 minutes and 42 seconds. The new bearings of his motor were stiff, and excessive speed probably would have been fatal to his chances of winning the Vanderbilt Cup for a second time.

Even when Oldfield was within 1 second of him and driving desperately in an effort to pass the Italian, De Palma assumed an "I should worry" attitude and plugged along doggedly as if determined to hold his schedule even if beaten. Running in the ruck for the greater part of the first half of the race, De Palma made his perseverance an asset, and when Pullen first was eliminated and then Anderson he assumed the lead and held it.

In its victorious journey of 294.03 miles, De Palma's Mercedes consumed 32 gallons of gasoline and 7 gallons of oil, an average fuel consumption of 9.18 miles to the gallon.

Oldfield Had Hard Luck

Oldfield's tire luck beat him. In all, Barney figures that he lost at least 8 minutes changing casings. Twice the left front went bad, which is rather unusual, while the right rear also suffered. In addition to that, Oldfield was handicapped the last few laps by a broken spark plug. He also claims that he discovered after the race that he had a broken piston ring, which made it imperative for him to be cautious to avoid overheating.

At the start of the race Wishart looked dangerous. Starting second, he was the first to cross the wire. Then he stopped for all time. It developed that the Mercer was suffering from a cracked cylinder.

After Wishart's withdrawal his teammate, Eddie Pullen, took upon himself the role of pacemaker. He kept in front from the second to the end of the thirteenth lap, when there came a skid and smashup on Death Turn, which changed Pullen from a contender to a spectator. While he was running, Pullen was moving. To him is credited the fastest lap of the race, 6 minutes and 3 seconds on his fourth circuit of the course, which is equal to 83.5 miles an hour. When eliminated, Pullen was between 3 and 4 minutes ahead of Gil Anderson. The Stutz pilot, however, was always in a position to take advantage of the least mishap to Pullen's Mercer, which he had been hanging to since early in the speed battle.

Records of Leading American Races

Miles	M.P.H.	Time	Driver	Car	Place	Date
500	78.7	6:21:06.03	Dawson	National	Indianapolis	May 30, 1912
411.36	74.45	5:31:29.13	B. Brown	Fiat	Grand Prix, Savannah, Ga.	Nov. 30, 1911
300	78.7	3:50:57	Tetzlaff	Fiat	Santa Monica	May 4, 1912
291.38	74.07	4:20:31.54	Mulford	Lozier	Vanderbilt, Savannah	Nov. 30, 1911
302.5	68.8	4:25:36.25	De Palma	Mercedes	Elgin Free-For-All	Aug. 31, 1912

Records of Leading Foreign Races

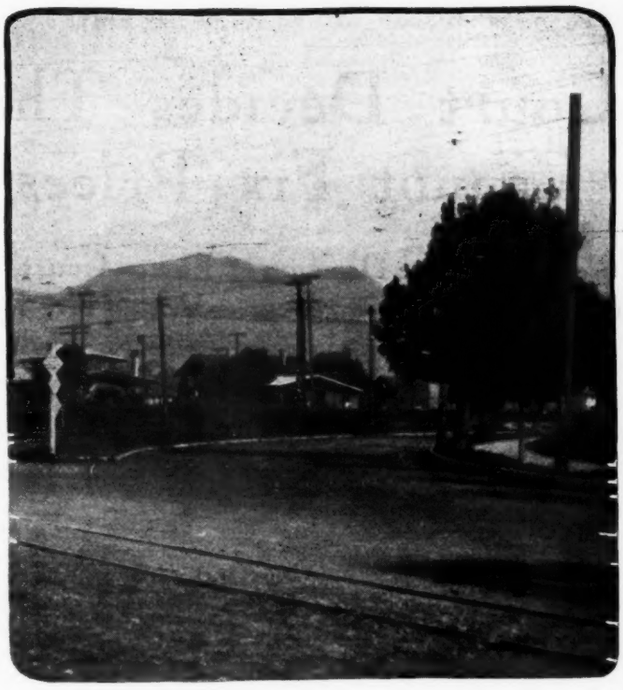
Miles	M.P.H.	Time	Driver	Car	Place	Date
569	72.03	7:53:56	Boillot	Peugeot	Amiens Grand Prix of France	July 12, 1913
402.4	72.7	5:31:54	Goux	Peugeot	Sarthe Grand Prix	Sept. 9, 1912
402.4	64.8	6:12:25	Zuccarelli	Lion Peugeot	Sarthe Grand Prix, 183 cu. in class	Sept. 9, 1912
328.2	74.3	4:25:21	Nazzaro	Fiat	Targo, Floria	Sept. 6, 1908
335.5	78	4:21:50	Bablot	Delage	Sarthe Grand Prix	Aug. 5, 1913
478.1	69.24	6:35:43	Lautenschlager	Mercedes	Grand Prix Dieppe	July 6, 1908

Anderson's reign as pacemaker was not for long. Although he remained in front for only four laps, it is a certainty that had it not been for the broken driveshaft the Indianapolis boy would have made De Palma fight much harder for his victory than he did.

De Palma Creeps Up

As long as Pullen led, De Palma was never better than fifth. With the Mercer out, Ralph crept up, passed Oldfield, who had clung tenaciously to the leaders, and went into second place. Barney never overtook De Palma again, although late in the race he was but 1 second behind.

Carlson's race was most consistent. Running fifth at the end of the eighth lap, he went into fourth place for four laps, and after that was never worse than third, except on one circuit, when he slipped back a notch.



Ocean avenue curve on the Santa Monica course

Pullen's elimination gave Earl Cooper his chance to finish inside of the money, the 1913 American road racing champion moving up to fourth place when the Mercer was permanently docked, and holding that position until the finish.

An unofficial summary of the casualties:

17 Alco, Janette out on 24th lap with broken axle.
3 Stutz, Anderson out on 18th lap with broken drive shaft.
15 Marmon, Ball out on 16th lap when he ran out of gasoline.
4 Mercer, Pullen out on 13th lap when car blew tire and collided with protective fence.
11 Apperson, Goode out on 11th lap with broken oil line.
14 Sunbeam, Marquis out on 10th lap with broken rear axle.
9 Fiat, Verbeck out on 9th lap with broken oil line and bearing.
2 Mercer, Wishart out on 2d lap with engine trouble.
1 Isotta, Grant out on 1st lap with broken piston.
6 Mason, Lewis out on 1st lap with cracked piston.

No hard words can be said about the course by any of the drivers. In spite of all of the skyspouts and flooding, a little sunshine brought a speedway complexion to the track—and the good quality was more than skin deep.

Whether the two great classics will stay out on the coast for Exposition year depends on the strength of the fight that Milwaukee and other applicants put up.

On the Golden Gate Park course, during the big fair season, there is no doubt that the Vanderbilt would have a fortunate staging. J. B. Ryall, a former race driver, who is bidding for 'Frisco, claims that in the event that the Vanderbilt goes to another place than the Exposition town that an effort will be made to interest Vincent Astor in an Astor cup race to be run at Golden Gate.

VANDERBILT CUP RACE HISTORY IN TABLOID FORM

Year	Winner Car and Driver	Distance miles	M.P.H.	No. of Starters	No. of Finishers	Place
1904	Panhard, Heath	284.4	52.23	18	2	Long Island
1905	Darracq, Hemery	283	61.05	19	4	Long Island
1906	Darracq, Wagner	297.1	61.43	17	5	Long Island
1907	No race held.					
1908	Locomobile, Robertson.	258.06	64.38	17	2	Long Island
1909	Alco, Grant	278.08	62.77	15	2	Long Island
1910	Alco, Grant	278.08	65.18	30	10	Long Island
1911	Lozier, Mulford	291.38	74.07	14	6	Savannah
1912	Mercedes, DePalma	299.54	68.97	8	5	Milwaukee
1913	Called off.					

RÉSUMÉ OF PAST STRUGGLES FOR THE GRAND PRIZE

1908	Fiat, Wagner	402.08	65.08	20	9	Savannah
1909	No race held.					
1910	Benz, Bruce-Brown	415.2	70.55	15	6	Savannah
1911	Fiat, Bruce-Brown	411.36	74.45	16	6	Savannah
1912	Fiat, Bragg	410.60	69.3	12	4	Milwaukee

SPECIFICATIONS AND EQUIPMENT OF CARS ENTERED IN VANDERBILT CUP AND GRAND PRIZE ROAD RACES

Car and Driver	No. Cyl.	Bore and Stroke	Piston Dis.	Wt.	Gear Ratio	Final Drive	Magneto	Spark Plugs	Carbureter	Tires
Fiat, Tetzlaff	4	6 x8	904	3250	.....	Chain	Bosch	Bosch	Master	Savage
Isotta, Grant	4	4 3-4 x6 1-3	449	2600	2 1-2 to 1	Chain	Bosch	Bosch	Zenith	Palmer Cord
Mercer, Wishart	4	4 3-4 x6 1-3	445	3000	2 1-4 to 1	Bevel	Bosch	Bosch	Rayfield	Palmer Cord
Stutz, Anderson	4	4 13-16x6	436	2450	2 to 1	Shaft	Bosch	Bosch	Schebler	Braender
Mercer, Pullen (4)	4	4 13-16x6 3-16	445	3000	2 1-4 to 1	Bevel	Bosch	Bosch	Rayfield	Palmer Cord
Delage, Dingley										
Mason, Lewis	4	4 5-16 x6	350	2000	2 1-4 to 1	Shaft	Bosch	Bosch	Master	Miller
Alco, Taylor (6)	6	4 3-4 x5 1-2	550	....	2 1-2 to 1	Shaft	Bosch	Bosch	Master	Miller
Mercer, Oldfield	4	4 13-16x6 3-16	445	3000	2 1-4 to 1	Bevel	Bosch	Bosch	Master	Braender
Stutz, Cooper (3)	4	4 13-16x6	436	2450	2 to 1	Shaft	Bosch	Bosch	Schebler	Braender
Fiat, Verbeck	4	5 1-8 x6 7-8	567	2650	2 to 1	Chain	Bosch	Bosch	Master	Batavia
Mercer, Gordon	4	4 3-8 x5	300.7	2300	2 1-4 to 1	Bevel	Bosch	Bosch	Master	Goodyear
Mason, Carlson (2)	4	4 5-16 x6	350	2000	2 1-4 to 1	Shaft	Bosch	Bosch	Master	Savage and Braender
Apperson, Goode	4	5 3-4 x5	519.4	2750	.....	Chain	Bosch	Bosch	Master	Kelly-Springfield
Mercedes, DePalma (1)	4	5 1-5 x6 1-5	598	2600	2 to 1	Chain	Bosch	Bosch	Master	Braender
Sunbeam, Marquis	6	3 1-10 x6 1-2	299	2250	2 3-4 to 1	Shaft	Bosch	Bosch	Claudel	Palmer Cord
Marmon, Ball (5)	4	4 3-4 x7	496.2	2900	2 3-10 to 1	Shaft	Bosch	Bosch	Master	Miller
Alco, Janette	6	4 3-4 x5 1-2	548	3325	2 to 1	Chain	Bosch	Pognon	Master	Miller
Marmon, Muth	4	4 1-2 x5	318.1	2600	2 3-4 to 1	Shaft	Bosch	Bosch	Master	.....
Touraine, Joerimann	6	4 x5 3-4	433.5	2650	2 1-4 to 1	Shaft	Bosch	Bosch	Master	Miller

(1) Mondex shock-absorber, Monogram oil. (2) Oilzum oil. (3) Monogram oil. (4) Hartford shock-absorbers.
(5) Motorese oil. (6) Valvoline and National oil.

Supreme Court Decides That Makers Cannot Fix Prices

Refuses To Change Decision of Lower Court in the Waltham-Keene Case—Decree Will Have Important Bearing on Automobile and Accessory Industries

WASHINGTON, D. C., March 2—The Supreme Court refused today to review the decision of the federal courts of New York City holding the Waltham Watch Co. could not fix the resale prices of watches by retailers.

Now that the Waltham-Keene decision has been handed down, there will be considerable adjustment in the business world necessary, as many companies have in the past strenuously upheld their right to maintain a fixed price for their products. The automobile and accessory people will be greatly affected as these companies have for a long time been fighting to have fixed retail prices. Lately a few representatives from the automobile factories in Detroit, have gone to Washington where they have defended the makers' prices.

Automobile Men Protest

On February 14, Henry B. Joy, president of the Packard Motor Car Co., Detroit, Mich., appeared before the judiciary committee of the House of Representatives. He urged the continuation intact of the Sherman anti-trust act with the interpretation that a maker may fix a universal price for his products.

A few days after Mr. Joy's speech in Washington, other representatives of automobile companies from Detroit made their appearance before this committee in support of fixed retail prices or different phases of proposed anti-trust legislation.

Alfred Lucking, a director of the Ford company, stated that he opposed monopoly but contended that where competition was sharp as in the automobile business, that a fixed, unvariable retail price would not operate to aid a monopoly.

History of the Case

The Waltham Watch Co. brought suit in January, 1913, against C. A. Keene, a jeweler, to compel him to sell watches made by the company at prices fixed by the Waltham concern. The defendant's attorneys replied that Keene had bought his watches in England and was at liberty to sell at reduced prices. The United States Circuit Court of Appeals affirmed, in December, the decree of Judge Ray in District Court dismissing the suit, and in January the case was taken to the United States Supreme Court. In dismissing the application for the injunction the court here held that it was contrary to public policy to permit a patentee to prescribe the terms of resale.

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Price Registry for Patent Articles

NEW YORK CITY, March 3—Makers of automobile accessories are affected by a bill introduced in Congress recently by Representative Langley of Kentucky, "to prevent fraud and unfair competition in the sale of patented and trade-marked articles."

The bill provides that the owner of every patent and trade-mark shall as a condition of such patent or trade-mark be required to file in the patent office a statement showing the prices at which any article covered by the patent or trade-mark is to be offered for sale. This statement must show the retail price of each article, together with the list showing all prices and rebates, commissions or discounts of every nature whatsoever at which the said article shall be sold or offered to dealers for the sale of or for the handling of such articles.

This list must be registered in the patent office under such rules and regulations as the commissioner of patents may prescribe. A new price list may at any time be substituted for a registered price list. All articles must be marked with the retail price at which the same are to be offered for sale and the words, "price registered," followed by date of registration.

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Tire Cover Patent Decision Reversed

NEWTON, MASS., Feb. 28—Both the Hopewell and Kinder patents on tire cases have been declared void by the decision rendered in the Circuit Court of Appeals. This decision reverses that of the lower court, which upheld the validity of these patents against the contention of the Vehicle Apron and Hood Co. The decision of the Circuit Court of Appeals was based entirely upon non-patentability. The patents involved were Nos. 854,215 and 881,411. Hopewell Bros. state that they will protect all parties who buy their spiral spring tire covers against patent litigation.

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Walker Restraining Order Dissolved

NEW YORK CITY, March 4—The temporary restraining order against the Walker Tire Chain Co., of Zanesville, O., by the Weed Chain Co., has been dissolved, because of the lack of jurisdiction. The court has refused to grant a further injunction. On February 3 last, the Weed company brought suit against the Walker Tire Chain Co., and R. F. Ely, doing business under the name of the Donnelly Motor Equipment Co., claiming an infringement on their patent No. 723,299. This suit was brought up in the U. S. District Court of the Southern District of New York.

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Klaxon Appoints Accounting Master

NEW YORK CITY, March 4—Until the return of F. H. Lovell, of the Lovell-McConnell Mfg. Co., from Europe, it is not expected that any further definite action along new lines for the licensing of new dealers or manufacturers of horns under Klaxon patents will be made. John Hill Morgan, who was appointed master to take accounting of the profits made by infringing dealers for selling horns, which infringed the Klaxon patents is expected to begin his work on the shortest notice and it will be his duty to perform such accounting with all dealers who desire licenses to sell Klaxons and who in the past have sold infringing signals.

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Government Wins in Test Customs Suit

WASHINGTON, D. C., March 1—A decision favorable to the government has been rendered by the United States court of customs appeals in the case of P. C. Kuyper & Co. vs. United States, involving the dutiable classification of pieces of steel designed for motor car frames.

The decision sets forth that the Saurer Motor Co. caused to be imported at the port of New York 250 pieces of steel designed and constructed to be used as frames for motor cars. They were about 19 feet long, 3-8 inch thick and of varying widths from 4 inches at the narrowest to 9 inches in the widest place. They were all larger in the middle than at the ends. As imported the merchandise was so shaped and reinforced by the processes applied, principally that of pressing, as to form the exact shape required in ultimate use for motor car frames. Certain holes and rivets were added after importation.

Duty was assessed by the collector of customs at New York under the provisions of paragraph 131 of the tariff act of 1909 and the relevant portion thereof as "pressed, sheared or stamped shapes, not advanced in value or condition by any process or operation subsequent to the process of stamping." The importers made claim that the merchandise was properly dutiable under paragraph 121 of said act as "structural shapes of iron or steel.

not assembled or manufactured, or advanced beyond hammering, rolling or casting."

The court observed that paragraph 121 was intended to cover a class of merchandise of a cruder form and ordinarily advanced to a less degree of manufactured completeness than paragraph 131. There are but two grades of rates in paragraph 121, the highest of which is made to apply to merchandise valued above 9-10 of 1 cent per pound, levying a duty of 4-10 of 1 cent per pound, while the schedule of rates in paragraph 131 extends in numerous specific provisions from a class of articles valued at 3-4 of 1 cent per pound upon which is levied a duty of 7-40 of 1 cent per pound to a class of articles valued above 40 cents per pound upon which is levied a duty of 20 per cent. ad valorem.

The importation in question, it is pointed out, consisted of a grade of steel devoted to a purpose which common knowledge indicates must be of great strength and as imported was, save for the boring of the holes for the rivets and the riveting, in a completed shape for final use. The merchandise was admittedly a pressed shape and the court ruled that it was more specifically provided for in paragraph 131, "which conclusion is reinforced by every intendment supported by the context of the applicable provisions of the law."

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Stutz To Erect New Factory

INDIANAPOLIS, IND., March 2—The Stutz Motor Car Co., with which has been consolidated the Stutz Auto Parts Co., has announced plans for the erection of a new factory building. It will be located at Tenth street and the Capitol avenue boulevard and will be one of the first factory buildings to invade an exclusive residence district.

The factory will be a four-story fireproof structure and will cost $100,000. Construction will start about April 1. The general offices of the company, now at 430 North Capitol avenue boulevard will be located in the new building. There will be no change in the agency arrangement, which is now held by the Fisher Automobile Co.

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Truck Dont's for Winter

NEW YORK CITY, March 3—The New York Edison Co. has issued an interesting card containing a list of the emergency charging stations in this city, and a few helpful hints for the truck driver, entitled, "Truck Don'ts for Winter." A few of these are as follows: Don't try to accomplish as much in the snow as you have on clear asphalt. Don't try to push a drift ahead of you. Leave it for the snow contractor. Don't sit still while the wheels go 'round in the slush. Have a box of sand and a kitchen coal shovel handy. Use sand liberally. It is cheaper than electricity. Don't forget an anti-skid device. An improvised one may be made by looping three or four turns of a rope around your tires. Don't forget that time may be gained by leaving your wagon at the corner and making side street deliveries on foot. Don't let your truck stay out all night for want of a boost. There are twenty-four emergency charging stations in New York City.

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Pennsylvania Rubber Elects Officers

JEANNETTE, PA., March 1—The Pennsylvania Rubber Co., has elected officers as follows: chairman of the board, Herbert DuPuy; president-treasurer, H. Wilfred DuPuy; vice-president, Charles M. DuPuy; general manager, Seneca G. Lewis; secretary, George W. Shiveley; assistant treasurer, Charles G. Morrill; directors, Herbert DuPuy, H. Wilfred DuPuy, Charles M. DuPuy, Seneca G. Lewis and George W. Shiveley.

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Euclid Light Car Has Unit Power Plant

NEW YORK CITY, March 5—Details concerning the Euclid light car, whose appearance was announced in the February 12 issue of THE AUTOMOBILE, have just been given out. The car is to be a side-by-side seater with a streamline body and left drive, and is fitted with top and windshield. The wheelbase is 100 inches, the tread 40 inches and the weight 775 pounds. A speed of 50 miles per hour is claimed, and it is stated that the car will go from 35 to 45 miles on a gallon of gasoline. A four-cylinder, air-cooled motor with 3 by 3.5-inch bore and stroke and capable of developing 15 horsepower at 1,000 revolutions per minute is used. Lubrication is maintained by a plunger pump that draws oil from a reservoir in the crankcase. Ignition is by high-tension magneto.

A two-speed forward and reverse sliding gearset of the progressive type and an inverted cone clutch, leather-faced are integral with the motor. From the gearset the power is transmitted to a drive shaft with a single universal joint and from thence to a semi-floating rear axle mounted on annular ball bearings. The brakes act on the rear wheel drums and the car is suspended on interchangeable cantilever springs. A rack and pinion steering gear that may be adjusted for wear is employed. Wire wheels, 28 by 3, are used and the price of the car fully equipped is $445. The Euclid is made by the Euclid Motor Car Co., 80 Broad street, New York City.

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Bantam Light Car Announced

BOSTON, MASS., March 4—The most recent addition to the light car field is the Bantam, a car with Renault type hood and side-by-side seating and selling for $385. A two-cylinder, V-type, air-cooled motor and friction transmission, left drive and center control are used. The weight is 700 pounds, the wheelbase 86 inches and the tread 46.

The motor has a bore and stroke of 3.5 by 3.75 inches and is rated at 14 horsepower. From the friction transmission power is transmitted through an enclosed chain drive to a semi-floating rear axle mounted on ball bearings. Contracting brakes on the rear wheel drums are used and wire wheels 28 by 3 are fitted. The equipment includes electric lamps front and rear, and a top and windshield. This car is made by the Bantam Motor Co., Boston, Mass.

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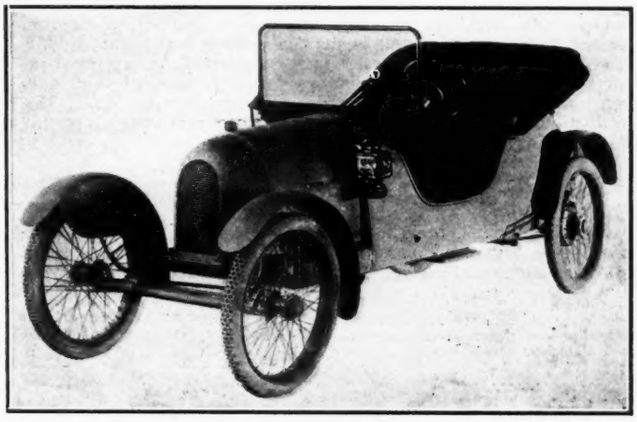
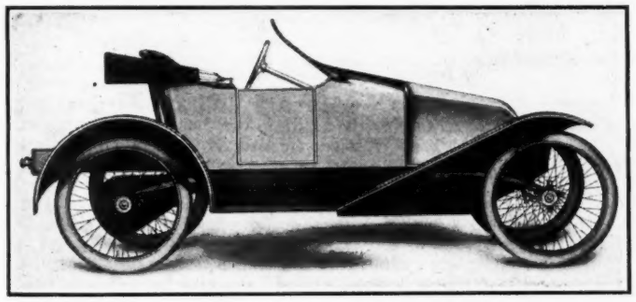
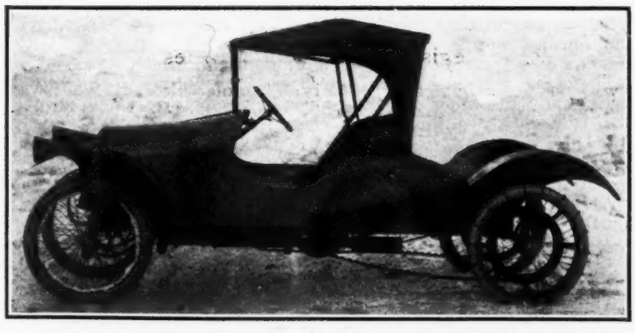
WILMINGTON, DEL., March 3—According to the list made public by the secretary of state, 1,697 private car owners took out automobile licenses in Delaware during January, 1914. In addition there are 102 dealers licensed.



Euclid light car with four-cylinder, air-cooled motor



New Bantam light car with Renault type hood



Saginaw cyclecar made by the Valley Boat and Engine Co., Saginaw, Mich. This car was described in THE AUTOMOBILE for February 12

Argo Car for $295

Briscoe To Make Two-Passenger Small Automobile with Four-Cylinder Motor and Wire Wheels

NEW YORK CITY, March 3—A small automobile, not a cyclecar, selling at retail for $295. Benjamin Briscoe has announced the Argo car, a small automobile carrying two passengers side by side. The power plant consists of a four-cylinder, water-cooled engine, cylinders 2.31-inch bore by 4-inch stroke, cast en bloc, and three point suspension. The cooling system is thermo-syphon, with a splash and pump lubrication, leather-faced cone clutch, sliding gear transmission, shaft drive and with a full elliptic spring front and rear. The wheelbase is 90 inches. Wire wheels of 28-inch diameter will be used. The weight of the car will be 700 pounds.

Mr. Briscoe's new company for the manufacture and sale of the car is the Argo Motor Co., Inc. The factory will be just outside of New York. Mr. Briscoe heads the company as president and general manager, while L. E. Latta is vice-president and general sales manager. F. D. Dorman is secretary and treasurer.

Associated with the company are also a number of the old engineers, factory men and dealers who have had a part in Mr. Briscoe's former enterprises. The company is accepting contracts with dealers and distributors for both domestic and foreign business and expects deliveries to commence in May. The production scheduled for this year is 10,000 cars and 20,000 for the following season, it is said.

Kelly-Springfield Tire Statement

NEW YORK CITY, March 3—The Kelly-Springfield Tire Co., a corporation organized under the laws of New York, reports the following statement of its condition as of December 31, 1913:

Assets	1913	1912
Machinery and fixtures	$43,327	$43,640
Mdse. or consignment	674,257	665,409
Cash and debts receivable	542,182	516,009
Total	$1,259,766	$1,225,058
Liabilities		
Capital stock	$5,000	$5,000
Accounts payable	1,254,766	1,220,058
Total	$1,259,766	$1,225,058

To Make Ajax Car in Seattle

SEATTLE, WASH., Feb. 28.—The Ajax, a distinctly new car, and one that will claim Seattle as its home, has been announced by the Ajax Motors Co., which is headed by Seattle capital and incorporated in the state of Arizona. Behind the company are George Parker, Frank L. Parker and Charles L. Parker. They will erect a factory within the city limits and will be in a position to make deliveries by October 1, 1914. The first year's output will be about 100 cars.

The Ajax has a six-cylinder motor with a bore of 4 1-2 inches and a stroke of 5 1-2 inches. The car will be produced in roadster, phaeton and touring models. The entire car, with the exception of forgings, frames and wheels, will be manufactured in Seattle. Gear blanks, axles and crank shafts will be obtained rough-forged from Krupp's in Germany, and will be machined and finished in the Ajax shops in Seattle. The company will have its own foundries for iron, aluminum and bronze parts.

The Ajax will be built in two styles, one with a piston-valve engine, and the other with a poppet valve motor. One feature that is peculiar to this power plant is that it can be changed from piston valve design to poppet valve, and *vice versa*, at comparatively small expense. The cylinders of the test model, which has been run several thousand miles, and which will be the model for the machines to be made, are cast in pairs, and have exceptionally large water ffijackets and valves.

The transmission gives four speeds forward and reverse, and is carried on the rear axle. The transmission axles revolve on large annular ball bearings. The rear axle is of the full-floating type, of pressed steel and designed to carry a heavy overload.

The car is built with left or right-hand steering. The engine is built upon an alloy aluminum casting which is suspended at three points. Cooling is by honeycomb radiator in combination with a twenty-inch ball bearing fan, which is driven by an adjustable belt. The car has no radius rods, the drive being through the two rear springs, the transmission case, propeller rod housing and a ball and socket joint at the center of the car. Bodies will consist of roadster, four and five-passenger and seven-passenger types. Limousines also will be offered. The wheelbase of the roadster will be 120 inches; four and five-passenger touring, 133 inches, and on the seven-passenger and limousine, 136 inches. Ward Leonard starting and lighting system is used.

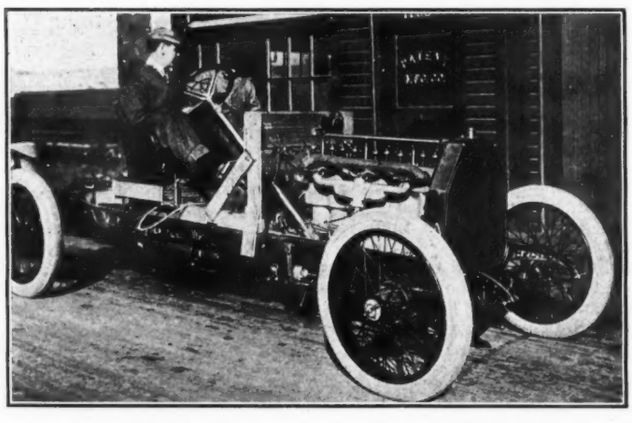
Automobile Securities Quotations

Changes in this week's security quotations were featured by a general rise in rubber quotations. Goodyear had a rise of 32 points. General Motors common which has been coming up rapidly during the past few weeks rose 4 points more.

	1913 Bid	1913 Asked	1914 Bid	1914 Asked
Ajax-Grieb Rubber Co., com	150	175	200	..
Ajax-Grieb Rubber Co., ptd	95	99	99	102
Aluminum Castings, pfd	99	101	97	100
Chalmers Motor Company, com	..	..	84	87
Chalmers Motor Company, pfd	..	..	92	94
Firestone Tire & Rubber Co., com	290	305	288	295
Firestone Tire & Rubber Co., pfd	102	104	108½	109½
Garford Company, preferred	98	100	80	90
General Motors Company, com	30	31	73	74
General Motors Company, pfd	77	78	92½	93¼
B. F. Goodrich Company, com	43	43½	22	23
B. F. Goodrich Company, pfd	99	100	87½	90
Goodyear Tire & Rubber Co., com	390	395	230	250
Goodyear Tire & Rubber Co., pfd	102	104	96	97½
Gray & Davis Co., preferred	..	..	90	97
Hayes Manufacturing Company	..	90	*	*
International Motor Co., com	5	15	..	5
International Motor Co., pfd	35	55	..	15
Kelly-Springfield Tire Co., com	..	..	56	57¼
Kelly-Springfield Tire Co., pfd	..	..	125	130
Kelly-Springfield Motor Truck Co., com	..	..	*	*
Kelly-Springfield Motor Truck Co., pfd	..	..	*	*
Lozier Motor Company, com	..	..	..	14
Lozier Motor Company, pfd	..	..	..	65
Maxwell Motor Company, com	..	..	5¼	5½
Maxwell Motor Company, 1st pfd	..	..	27¼	28
Maxwell Motor Company, 2nd pfd	..	..	9	9¾
Miller Rubber Company	186	190	128	132
New Departure Mfg. Co., com	..	..	118	125
New Departure Mfg. Co., pfd	..	..	103	..
Packard Motor Company, com	..	..	101	116
Packard Motor Company, pfd	102	105	96	98½
Palmer & Singer, preferred	..	..	..	65
Peerless Motor Company, com	..	..	..	30
Peerless Motor Company, pfd	..	..	..	80
Pope Manufacturing Co., com	..	30	1	3
Pope Manufacturing Co., pfd	..	75	11	16
Portage Rubber Co., com	..	..	..	40
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	11½	12½	7½	8½
Reo Motor Car Company	20½	21½	18	18½
Rubber Goods Mfg. Co., pfd	104	106	105	115
Russell Motor Car Co., com	..	..	*	*
Russell Motor Car Co., pfd	..	..	*	*
Splitdorf Electric Co., pfd	..	..	40	50
Stewart-Warner Speedometer Co., com	..	..	47	48½
Stewart-Warner Speedometer Co., pfd	..	..	98	100
Studebaker Company, com	31	32½	23½	25
Studebaker Company, pfd	88	93	80	81½
Swinehart Tire Company	95	102	70	71
U. S. Rubber Co., com	63	63⅜	59¼	59¾
U. S. Rubber Co., pfd	105½	106	101¼	101½
Vacuum Oil Co	..	..	213	216
White Company, preferred	..	..	107	110
Willys-Overland Co., com	64	69	67½	68½
Willys-Overland Co., pfd	93	97	93	96

*No market.

NEW YORK CITY, March 2—The regular quarterly dividend of 1¾ per cent. upon the preferred stock of the Packard M. C. Co., Detroit, Mich., payable on March 14, has been declared.



Chassis of new Ajax car to be built in Seattle, Wash.

To Make Singer Car

C. A. Singer To Form New Company for That Purpose—Palmer & Singer Co. Bankrupt

NEW YORK CITY, March 3—Announcement has been made by Charles A. Singer, formerly president of the Palmer & Singer Mfg. Co., that plans for the formation of a new company are well advanced for the manufacture and marketing of a new car to be known as the Singer. Details as to location of plant, size of car and price will be announced later.

Palmer & Singer Mfg. Co. Files Petition

NEW YORK CITY, March 3—The directors of the Palmer & Singer Mfg. Co., a $1,000,000 corporation, makers of the Palmer-Singer automobile, decided at a meeting held yesterday to file a voluntary petition in bankruptcy for the purpose of protecting the stockholders. The papers were filed today before United States Judge Veeder in Brooklyn.

It could not be learned what the assets and liabilities of the corporation were. S. P. Woodard, the secretary, said he didn't know the exact figures, but that the liabilities were in excess of the assets. In anticipation of the filing of the papers. Mr. Woodard had prepared the following statement:

"It is stated by the officers of the company that the cause of this action was the fact that developments along certain lines during the last 9 months had not proved profitable. Costly experiments were introduced which at the present time have not been perfected and cannot be continued because of want of working capital.

"The officers further stated that the cause of the present situation was not any inability to market Palmer & Singer cars, but that the demand for these cars continues in an increasing volume. On account of the first mentioned developments the officers of the company felt it advisable to conserve the interests of the creditors and stockholders of the company by a receivership.

"Mr. Singer stated that the orders on the books of the company at the first of the year were in excess of past records and more than sufficient to maintain the running capacity of the plant."

Market Changes of the Week

A few small changes occurred in this week's market reports. Electrolytic copper dropped $0.00 1-4 a pound while the Lake rose $0.00 1-10. Cottonseed oil dropped $0.04, closing at $7.13 per barrel. Tin dropped $0.25 per 100 pounds.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	.....
Beams & Channels, 100 lbs.	1.36	1.36	1.36	1.36	1.36	1.36	.....
Bessemer Steel, ton	21.00	21.00	21.00	21.00	21.00	21.00	.....
Copper, Elec., lb.	.14⅝	.14⅝	.14⅝	.14⅝	.14⅜	.14⅜	— .00¼
Copper, Lake, lb.	.14⅜	.14⅜	.14⅜	.14⅜	.14½	.14½	+ .00 1/10
Cottonsced Oil, bbl.	7.17	7.17	7.17	7.11	7.05	7.13	— .04
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.16	.16	.16	.16	.16	.16	.....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	.....
Lead, 100 lbs.	4.00	4.00	4.00	4.00	4.00	4.00	.....
Linseed Oil	.52	.52	.52	.52	.52	.52	.....
Open-Hearth Steel, ton	21.00	21.00	21.00	21.00	21.00	21.00	.....
Petroleum, bbl., Kans. crude	1.05	1.05	1.05	1.05	1.05	1.05	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	.....
Rubber, Fine Upriver, Para	.77	.75	.75	.75	.76	.74½	— .02½
Silk, raw Italy	....	5.15	....	....	5.15	5.15	.....
Silk, raw Japan	....	4.30	....	....	4.30	4.30	.....
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	38.25	38.25	38.00	37.90	39.15	38.00	— .25
Tire Scrap	.04½	.04½	.04½	.04½	.04½	.04½	.....

It was learned that another cause for the failure is the lack of harmony prevailing among the various interests in the company during the last 9 months. The officers of the company, it is said, agree perfectly, but some of the stockholders oppose their plans for the company.

The largest stockholder in the company is the president, Charles A. Singer. At one time Mr. Singer held more than $500,000 in claims against the company, but he finally took stock for them. The other officers are: Charles A. Singer, Jr., vice-president; G. Stanley Heft, treasurer; S. P. Woodard, secretary. The plant is at Webster and Second avenues, Long Island City.

Overland-Garford Graduates Truck Engineers

CLEVELAND, O., Feb. 28—The first term of the Overland-Garford School for Truck Engineers, 6604 Euclid avenue, has just been completed and the graduates are as follows: William Du Bois, W. T. Davies, T. S. Houston, John Becker, A. Bradbury, G. Stice, Albert May, W. R. Cubbon, G. Knudmiller, H. W. Sears, Louis Weinner, F. S. Tebbs, A. Lezius, R. E. Nesbitt, Roy Hull, H. H. Meginess. This class was made up of truck drivers, truck owners and representatives of companies operating trucks who realize that the future of the motor truck is largely in the hands of the men who operate them. With this point in mind the course of instruction has been laid out, covering shop work, class instruction and lectures by outside engineers.

BOSTON, MASS., March 3—The Patterson Rubber Co., Lowell, Mass., is in financial difficulties. A creditors' meeting will be held on Friday, March 6, at the American House, Hanover street, this city, where a full statement of its financial condition will be read.

Mais Stockholders Lose Subscriptions

INDIANAPOLIS, IND., March 2—Stockholders of the old Mais Motor Co., who subscribed to a fund of $75,000 in an effort to save the company from a receivership, will not receive any part of this money back, according to a decision just handed down by the Indiana appellate court. The decision was given on an appeal from the lower court's ruling as to how assets should be distributed by the receiver. The lower court's decision was affirmed by the higher court.

When it appeared the company would be forced into a receivership, some of the stockholders raised a fund of $75,000 for working capital, but this sum did not prove sufficient to float the concern. After the company's assets had been disposed of by the receiver, it was found there was $71,000 cash in hand to be distributed.

In its decision the court says those who subscribed to the $75,000 fund are not equal creditors with the merchandise creditors or with the attorneys.

INDIANAPOLIS, IND., March 2—At a meeting of directors of the Mais Motor Truck Co. last Saturday the last obligation was paid to Franklin Vonnegut, receiver for the old Mais Motor Truck Co. The old company went into the hands of a receiver July 9, 1912, and was taken over by the present organization, officers of which are: President, H. G. Francis, Rushville; vice-president, W. M. Pearce, Rushville; secretary-treasurer, A. S. Lockard; superintendent, L. A. Caswell and purchasing agent, J. S. Sinclair.

Mosler Factory Sold for $93,000

NEW YORK CITY, March 3—A. R. Mosler & Co., Mt. Vernon, N. Y., has sold its factory and property to the Bronx Parkway Commission for $93,000. This property will be used for an extension of a boulevard to Kensico. Two new factories will be erected in about 6 months and the present arrangement of having the screw machine and the spark plug forces in one plant will be changed. These two departments will be separated, each occupying a plant. The site for these new plants has not as yet been decided upon.

Bretz Denies Rumor

NEW YORK CITY, March 4—The J. S. Bretz Co., of this city, through its president, J. S. Bretz, has issued a statement to the effect that the company is not interested in the Massnick-Phipps Mfg. Co., Detroit, which latter concern is developing a cyclecar motor in addition to its other activities, as stated in a Detroit telegraphic dispatch in last week's issue.

Export of Cars to the Philippines Increasing

December Figures Show Gain of 40 Per Cent.—Fewer Cars Taken by Hawaii and Porto Rico

WASHINGTON, D. C., Feb. 26—Details of the shipments of motor cars and parts to the non-contiguous territories of the United States during December last and the calendar year ending December 31, 1913, with comparative figures for the corresponding periods, have been announced by the federal bureau of statistics.

American motor cars are winning their way in the Philippines. the statistics showing that the number of cars shipped there increased from thirty-eight valued at $45,277, in December, 1912 to fifty-four, valued at $53,785, in December last. During the calendar year the number increased from 475, valued at $616,761, in 1912, to 679, valued at $843,958, in 1913. Shipments of parts likewise increased in value from $1,877 in December, 1912, to $9,229 in December last, and from $53,070, in 1912 to $74,660, in 1913.

Due to the fact that traffic between this country and Alaska is suspended during the winter months, there were no shipments of motor cars to Alaska during December of 1912 and 1913. During the calendar year the shipments increased from fifteen cars, valued at $19,664, in 1912, to twenty-seven cars valued at $25,449 in 1913. Shipments of parts, not including tires and engines, decreased from $4,034 to $3,931.

Hawaii is not holding up as a good purchaser of American built motor cars. In December, 1912, this country shipped to that country seventy-five cars, valued at $130,208, while in December last the number had decreased to forty-eight, valued at $63,595. During the calendar year the number of cars shipped to Hawaii declined from 636, valued at $1,024,238, in 1912, to 597, valued at $1,006,937, in 1913. Exports of parts declined in value from $14,591, in December, 1912, to $9,441, in December last, but in the calendar year increased from $86,331 in 1912 to $92,228.

Shipments of cars to Porto Rico, like those to Hawaii, are not holding up. In December, 1912, there were forty machines, valued at $44,486, shipped to that island, while in December last the number had decreased to twenty-seven, valued at $29,615. During the calendar year the number of cars shipped to the island was 409, valued at $562,081, in 1912, while in 1913 the number was 294, valued at $365,391. Shipments of parts showed a similar decline, the figures indicating that $4,844 were shipped in December, 1912, while in December last the value was only $4,670. During the calendar year the shipments declined in value from $114,316, in 1912, to $82,872 in 1913.

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Herreshoff Company in Difficulty

DETROIT, MICH., Mar. 2—A number of the creditors of the Herreshoff Motor Co. have met in this city and filed a petition in involuntary bankruptcy against the concern. A custodian has been appointed who is now in possession of the property through a representative. The creditors have designated a committee consisting of H. W. Patton, Detroit Body Co.; J. H. French, Michigan Stamping Co., and J. L. Dryden, Long Mfg. Co., for the purpose of soliciting all claims of all creditors to vote in favor of the election of the Security Trust Co. as trustee at the first meeting of the creditors.

The Lycoming Foundry and Machine Co., Williamsport, Pa., has, through a representative, managed the Herreshoff company since last fall, this concern furnishing the Herreshoff motors and being the largest creditor, its claims amounting to more than one-half of the Herreshoff's total indebtedness.

But under this management the Herreshoff concern is said to have gone from bad to worse, and the action taken is the outgrowth of this condition. Rather sensational charges have been preferred against the Lycoming company by the creditors' committee.

In requesting the power of attorney from all creditors, the committee makes the following statement:

"In the fall of 1913 the Herreshoff Motor Co. found itself in financial difficulties and called together a number of its larger creditors and asked an extension of time. The situation was canvassed and it was decided to grant such extenson provided the creditors could be represented on the board of directors, and provided further, that the Lycoming Foundry & Machine Co., which had built the engines for the Herreshoff Motor Co., would send a representative to Detroit to stay on the job and see that proper motors were secured and installed in the cars to be shipped after that date.

"In furtherance of this proposition, notes were sent out which were accepted by most of the creditors, and particularly the larger creditors accepted the notes on the understanding that no interest was to be paid to anyone. The concern continued since under the management of the Lycoming company's representative and instead of conditions becoming better, they became worse."

It is further claimed that the Lycoming company has been taking interest on its accounts and has also applied upwards of $6000 upon its claim, while the rest have received nothing.

It is also said that the Lycoming company failed to furnish the proper character and class of motors, and the loss sustained by the Herreshoff company by reason of the rejection of its cars on this account is pointed out as being the real reason for the concern's financial difficulties.

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Uniform Automobile Law Compiled

NEW YORK CITY, March 2—The work of compiling a uniform motor law draft for the states of Delaware, Pennsylvania, Maryland, New York and such other states as are willing to join in the movement was completed at a meeting in New York last Wednesday, a bill having been drawn for presentation to the legislatures of the several states interested.

The commission which handled the matter was appointed by the governors of the several states, and the bill was drawn by Sylvester D. Townsend, Jr., of Wilmington, Del., former city solicitor in that city. He presented the bill to the other commissioners at the meeting on Wednesday and they approved it and authorized its presentation to the several legislatures. The other commissioners present were Charles G. Guyer, secretary of the Delaware Automobile Association; Highway Commissioner E. M. Bigelow and Robert P. Hooper, president of the Pennsylvania Motor Federation, representing Pennsylvania; Dr. H. M. Row, of Baltimore, president of the Automobile Club of Maryland, representing that state, together with Highway Commissioner Harry A. Roe, of Maryland.

The proposed act covers all the various phases of the present automobile laws and was prepared from a comparative digest of the existing laws in those states. It is, however, comparatively brief, containing about 8,000 words, as against the Massachusetts law of 14,000 words, for instance.

It aims at uniformity on at least five cardinal points of motor legislation; namely, speed, examination of all operators, power to refuse to grant a license (and, for cause, to revoke one already granted), control of the non-resident motorist and imposition of penalties for violations of the law. It provides that vehicles shall be operated with due regard to public safety and to the width of the highway and the condition of traffic, and that speed in excess of 24 miles an hour shall be considered *prima facie* evidence of reckless driving should an accident occur. It does away with the distinction between "chauffeur" and "operator" insofar as license is concerned, and provides for an examination as to competence before license is granted to any driver. It gives the power to the secretary of state or the motor vehicle commission or commissioner, as the case may be, to refuse license and to suspend or revoke it for intoxication or other cause, and thus opens the way also for the control of the non-resident motorist through complaint to the proper authorities of his home state.

Though not embodied in the bill, it was voted the sense of the commission that lights should be carried on all vehicles, whatever their motive power.

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Speedwell Company Elects Directors

DAYTON, O., March 2—Directors of the Speedwell Automobile Co., Dayton, O., were elected at the annual meeting of stockholders recently and the board will meet next month to elect officers. Henry Mead was chosen to succeed J. E. Schneider, who has gone to the N. C. R. Other directors are J. E. Sauer, F. A. Funkhouser, E. F. Kimmel, R. A. Herbuck, P. D. Schenck, Walter Worman and W. L. Caten. Mr. Schenck is president of the company.

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NEW YORK CITY, March 3—A 1912 Buick, driven by Johnson Martin, has crossed the Andes. This is the first car to make the trip. The trip consisted of a run of 1,000 miles across a cattle country, swampland, and pampas to reach Mendoza, from Buenos Aires. After leaving Mendoza, he entered the mountains where he crossed the backbone of the South American continent at a height of more than 13,000 feet, through the famous Uspallata Pass. It took him 2 weeks to perform the feat.

100,000 See Show at Omaha—Many Sales

Seventy-Four Makes Represented—Reports of Other Shows—Dealers Optimistic Throughout the Country

OMAHA, NEB., Feb. 28—The ninth Omaha automobile show, held under the auspices of the Omaha Automobile Show Association, was held in the Auditorium last week. There were forty exhibitors with seventy-four makes of cars represented, and 168 machines on the floor. The value of the exhibits was estimated at $300,000 and the number of visitors at 100,000.

Thirty-five passenger car dealers are exhibiting. Of this number there are ten dealers who are also showing commercial cars and four dealers who handle electric cars. This is the same number of exhibitors as last year, but through the withdrawal of accessory dealers more space has been given and there are more cars shown.

The automobile industry in the middle west is in a decidedly healthy condition. Never before have their been so many optimistic reports on the sale of cars for the coming year as are heard on every hand in this territory at the present time. Last year was a remunerative year for Omaha automobile dealers, they having sold cars to the value of $10,819,158 and the accessories sold amounted to $2,284,500. This, the dealers say, will be far surpassed in 1914.

The present winter in Nebraska has been mild and business of all kinds has enjoyed a good season. Reports on crop conditions are very favorable.

Omaha's dealers and distributors have a large territory in which to dispose of their products. The people of Nebraska, the western four tiers of counties in Iowa, South Dakota, northern part of Kansas, northwestern portion of Missouri, eastern parts of Montana, Wyoming and Colorado, all contribute to the coffers of the Omaha dealers. The greatest demands, however, come from Nebraska and the western parts of Iowa.

The interest of the buying public seems to be centered on those cars that sell for $1,000, or below $1,500.

The only automobile dealers' association that Omaha has is the Omaha Automobile Show Assn., which has to do primarily with the show. Other matters affecting automobilists are handled by the Omaha Automobile Club.

15,000 See Hartford's Biggest Show

HARTFORD, CONN., Feb. 28—Hartford's automobile show concluded at the Park Casino at 11.30 this evening. The show committee asserts it was the most successful exhibition ever staged in this city. The attendance for the week was about 15,000. Many sales have been reported by the various dealers who displayed cars. The show management announces that a substantial dividend will be returned to the members of the Hartford Automobile Assn., under whose auspices the exhibition was held. This was the seventh show held by the dealers' association and that it was a success makes certain a show in 1915.

Cincinnati Dealers Optimistic for 1914

CINCINNATI, O., March 2—The fourth annual show of the Cincinnati Automobile Dealers' Association was held in the north wing of Music Hall, and ran until March 4. The last three days were taken up in the exploitations of the new model trucks.

Thirty-one different types of pleasure cars were displayed. Of these only five are electrics. About 200 machines were on the floors and they ranged from the $7,500 limousine to the $395 cyclecar. The first floor has a space of 17,700 square feet and the top floor 14,900 square feet.

Business in this territory during the past year picked up quite a bit compared to the year before. The dealers look towards 1914 as one of the good years for sales. In 1911 there were approximately 3,400 cars in Cincinnati. The following year saw an increase of about 1,100 and last year the total reached over 6,500. For the first 2 months of the new year the sales have amounted to about 150, with the result that in round numbers there are in Cincinnati to-day 6,650 cars. The machine most sold seems to come from the $1,000-$1,500 class.

The Overland, Buick, Ford and Studebaker agencies report themselves in good shape. Harry Leyman, of the Leyman-Buick Co., and president of the Cincinnati Automobile Dealers' Assn., reports that he sold about 45 per cent. more machines in 1913 than he did in 1912. He has ordered twice as many machines for 1914 as he did for 1913, and now believes he has not enough. Just the other day a train load of Buicks got in. There were $214,770 worth in the sixty-two carloads. All these cars had been sold.

The Leyman agency covers parts of Indiana, West Virginia and the southeastern and southwestern portions of Ohio, and all of Kentucky for the Buick company. Throughout the tobacco districts of Kentucky the sales during the past year took enormous jumps. The tobacco crops were good and the farmers invested their money in automobiles. Crops were also good in Indiana, Ohio and West Virginia, with the result that more cars than ever before found their way into the rural districts.

The Ford agency also reports many sales in the tobacco districts of Kentucky. Manager Reynolds states that the Fords are selling at twice the rate of last year. His original order for 1914 called for an allotment of 4,600 cars, but now he is after more. In Cincinnati territory last year 1,400 cars were bought at retail prices. For the first 20 days of the present month 400 machines were disposed of.

The dealers in the more expensive cars also have encouraging reports. The electrics do not make as good a showing as the gasoline cars, although the sales of the latter have been increasing.

Medium-Priced Car Central Ohio's Favorite

COLUMBUS, O., March 2—A fairly good crowd attended the opening of the second annual "Automobile Carnival" at Columbus, Ohio, which started February 28 to last for 1 week, despite the rain which fell during the evening. The Carnival is given under the auspices of the Columbus Auto Trades Assn., and the Columbus Automobile Club and takes the place of the annual automobile show.

The carnival was held along "Automobile Row," which comprises North Fourth street between Broad and Chestnut streets. The streets were decorated for the occasion and all of the salesrooms were in gala attire. Dealers who were not located on "Automobile Row" were given space to show their models in the salesrooms of the other dealers. In all fifty different makes and about 250 cars were exhibited.

According to the dealers in Columbus and Central Ohio the prospects for 1914 are excellent in every way. While it was a little slow up to the first of the year, there has been a marked improvement since. Business conditions generally have improved and there are fewer men out of work. Manufacturing enterprises are running with a larger payroll and the volume of business is increasing. Farmers are generally feeling good as the crop prospects are good.

Dealers believe that the sale of medium-priced cars will be one of the features of business in Central Ohio. While the cheap cars will undoubtedly be in good demand, it is expected that cars ranging in price from $1,200 to $2,200 will also be sold in large numbers.

270 Applicants for Space at Berlin

PARIS, Feb. 20.—After an agreement with other European show promoters, Berlin has fixed its show dates for September 26 to October 6. This show will be the first of the European series, and will be followed by Paris in the middle of October, London in November, and Brussels in December. A special hall is being erected for the show. The number of firms already having applied for space is 270.

Automobile Dealers Elect Officers

NEW YORK CITY, March 4—The newly elected board of directors of the Automobile Dealers' Assn., met on Tuesday, March 3, for the purpose of electing officers. R. H. Johnston, of the White company was unanimously elected president; Charles H. Larson, of the Oldsmobile company, was re-elected vice-president, and Frank Eveland, of A. G. Spalding & Bros., was re-elected secretary and treasurer. Charles A. Stewart continues as general manager.

The large number of bills pending before the State Legislature were brought up for discussion as well as the number of City Ordinances pending before the board of aldermen. It was decided to appoint a special committee to take charge of each of these subjects and Mr. Johnston will announce the personnel of these committees within a few days.

ROCHESTER, N. Y., March 3—At the annual meeting of the Vacuum Oil Co. the directors were re-elected. The charter of the company was extended 50 years.

Exhibitors at Boston Passenger-Car and Truck Shows

Abbott Motor Co.....Detroit, Mich.
A. C. C. Oil Co.....Providence, R. I.
Acme Torsion Spring Co.....Boston
Aetna Life Insurance Co.....Boston
Ajax Trunk and Sample Case Co.....New York
Allen Motor Company, The.....Fostoria, Ohio
American Cyclecar Co.....Bridgeport, Conn.
American Express Co.....Boston
American Lava Co., The.....Chattanooga, Tenn.
American Motor Equipment Co.....No. Boston
American Storage Battery Co.....Cambridge, Mass.
American Tire Co.....Montello, Mass.
American Voiturette Co.....Detroit, Mich.
Anderson Electric Car Co.....Boston
Andrews Co., Charles G.....Boston
Apperson Bros. Auto Co.....Kokomo, Ind.
Arnold, N. B.....Brooklyn, N. Y.
Auto Electric Trouble Station.....Boston
Auto News Publishing Co.....Boston
Automatic Appliance Co.....Boston
Automatic Tire Rest Co.....Kansas City, Mo.
Automobile Dealer and Repairer.....New York
Automobile Journal Pub. Co.....Pawtucket, R. I.

B. & R. Shock Absorber Co.....Philadelphia, Pa.
Bailey & Co. Inc., S. R.....Boston
Baker, W. A.....Melrose, Mass.
Barnstead Water Still Co.....Boston
Bascom, George R.....Boston
Baxter Side Co.....Cambridge
Blodgett & Johnston.....Boston
Bonner & Co., The D. Henry.....Cambridge, Mass.
Boston Tire & Rubber Co.....Boston
Bowman Company, The J. W.....Boston
Bowser Co. Inc., S. F.....Boston
Boyd, F. Sairley.....Boston
Braender Rubber & Tire Co.....New York
Briscoe Motor Co.....Jackson, Mich.
Brock Rubber Co., A. S.....Boston
Buffington & Co., C. A.....Berkshire, N. Y.
Buick Motor Co.....Boston
Burn Boston Battery & Mfg. Works.....Boston

Cadillac Automobile Co. of Boston.....Boston
Cainan, James P.....West Upton, Mass.
Campbell Co., A. S.....Boston
Cape Cod Power Dory Co.....Wareham, Mass.
Carter, Fred C.....Cambridge, Mass.
Cartercar Co., The.....Pontiac, Mich.
Case Threshing Machine Co., J. I.....Boston
Cataract Rubber Co., The.....Boston
Chalmers Motor Co.....Detroit, Mich.
Champion Spark Plug Co.....Toledo, Ohio
Chandler Motor Car Co.....Cleveland, Ohio
Chandler & Farquhar Co.....Boston
Chevrolet Motor Co. of N. E.....Boston
Charles Motor Co.....Boston
Cole Motor Co. of Boston.....Boston
Columb Tyres Import Co. Inc.....New York
Columbus Buggy Co., The.....Columbus, Ohio
Collins, George.....Boston
Combination Tail Light Co.....Boston
Colby, C. B.....Boston
Connell, W. J.....Boston
Connell & McKone Co.....Boston
Coward Auto Supply Co.....Boston
Cox Co. Inc., A. W.....Cambridge, Mass.
Cox Brass Mfg. Co.....Albany, N. Y.
Curtis-Hawkins Co., The.....Boston
Cutter, J. Frank.....Cambridge, Mass.

Dahl Manufacturing Co.....New York
Dayton Tire Co., The.....Boston
Dean Auto Devices Co.....Chicago
Derry & Co., D. H.....Bridgeport, Conn.
Doan & Co., W. B.....Boston
Dodge, Frank.....Boston
Donovan Motor Car Co.....Boston
Dutton Motor Co. Inc., F. A.....Boston

Eagle Oil & Supply Co.....Boston
Eastern Oil Tank Co.....Lowell, Mass.
Earnsdale Worsted Co.....Clinton, Mass.
Eavenson & Sons, Inc., J.....Camden, N. J.
Edelman & Co., E.....Chicago, Ill.
Eisner-Lenk Co.....Boston
Elite Mfg. Co., The.....Ashland, Ohio
Essex Engine Co.....Lynn, Mass.
E. Z. Rim Co.....Boston

Fiat Motor Sales Co.....Boston
Fischer Co., C. J.....Cambridge, Mass.
Flentje, Ernest.....Cambridge, Mass.
Ford Motor Co.....Boston
Ford Company, Percy.....Boston
Forbes, Walter J.....Boston
Forest City Electric Co.....Cleveland, Ohio
Fox Auto Searchlight Co.....Providence, R. I.
Franklin Motor Car Co.....Boston
Fryer Co., Chas. H.....Providence, R. I.
Fuller, Alvan T.....Boston

Gage, J. Prescott.....Yonkers, N. Y.
Garford Co., The.....Elyria, Ohio
Green & Swett Co.....Boston
Gurnard Mfg. Co.....Beverly, Mass.
G. I. M. Vulcanizing Co.....Boston

Harding Specialties Co., The.....Boston
Harding, W. A.....Boston
Harley-Davidson Motor Co.....Boston
Havers Motor Car Co.....Port Huron, Mich.
Havoline Oil Co.....Boston
Haynes Automobile Co., The.....Kokomo, Ind.
Hendee Mfg. Co.....Springfield, Mass.
Henley-Kimball Co., The.....Boston
Herff-Brooks Corp.....Indianapolis, Ind.
Herreshoff Motor Sales Co.....Troy, N. Y.
Hillman Auto Supply Mfg. Co.....Boston
Holden, George N.....Boston
Hollander Motor Co.....Boston
Holtzer-Cabot Electric Co.....Brookline, Mass.
Holt & Beebee Co.....Boston
Hopewell Brothers.....Newton, Mass.
Houk Co., George W.....Buffalo, N. Y.
Howard-Potter Co., The.....Boston
Hudson Motor Car Co.....Detroit, Mich.

Hub Cycle Co.....Boston
Hupp Motor Car Co.....Detroit, Mich.
Hutton Co., Fred W.....Brockton, Mass.
Hydraulic Oil Storage & Eng. Co.....New York

Indian Refining Co.....Boston
Imperial Automobile Co.....Boston
Inter State Motor Co.....Muncie, Indiana
International Metal Polish Co.....New York
Invader Oil Co.....New York

Jackson Motor Car Co.....Boston
Jackson Co., The Chas. A.....Boston
Jager Engine Co.....Boston
Jenerson Motor Cycle Agency.....Arlington, Mass.
Jeffery-Dewitt Co.....Detroit, Mich.
Jeffery Co., Thos. B.....Kenosha, Wis.
Johns-Manville Co., H. W.....Boston
Justice Co., A. R.....Phila., Pa.

Kanner Samuel.....New York.
Keeton Motor Co.....Detroit, Mich.
Kelleher Co., J. J.....Dorchester, Mass.
Kenney, A. E.....Boston
Keating & Decker.....Newton, Mass.
Keystone Lubricating Co.....Boston
Kilgore Motor Starter Co.....Boston
Kilham, J. F.....Beverly, Mass.
Kissel Kar Co.....Boston
King Motor Car Co.....Boston
Knauss, Edward.....Boston
Knox Automobile Co.....Boston
Krit Motor Car Co.....Detroit, Mich.
Lapointe Co., The J. N.....New London, Conn.
Lawrence & Stanley Co.....Boston
Lavigne Cyclecar Co.....Detroit, Mich.
Leland-Gifford Co.....Worcester, Mass.
Lenox Motor Car Co.....Boston
Lewis Mfg. Co.....Bridgeport, Conn.
Lexington-Howard Co.....Connersville, Ind.
Linscott Motor Co.....Boston
Linscott Supply Co.....Boston
Locomobile Co. of America.....Boston
Lozier Motor Co.....Detroit, Mich.

MacAlman, J. H.....Boston
Maddocks Co., Inc., H. Ross.....Boston
Maguire Co., J. W.....Boston
Mark Motor Supply Co.....Boston
Marburg Brothers.....New York
Marion Motor Car Co.....Indianapolis, Ind.
Marathon Tire & Rubber Co.....
Max Machine Co.....Clinton, Mass.
Maxwell Motor Co., Inc.....Detroit, Mich.
McFarlan Motor Co.....Connersville, Ind.
Mercer Automobile Co.....Trenton, N. J.
Mercury Cyclecar Co.....Detroit, Mich.
Merz Cyclecar Co.....Indianapolis, Ind.
Metz Co.....Waltham, Mass.
Meyers Brothers.....New York
Middleboro Auto Exchange.....Middleboro, Mass.
Miller, Chas. E.....New York
Mitchell-Lewis Motor Co.....Racine, Wis.
Mohawk Rubber Co.....Akron, Ohio
Morse & Co., Alfred Cutler.....Boston
Motor Car Mfg. Co.....Indianapolis, Ind.
Motor Accessories, Inc.....Boston
Motor Parts Co.....Boston
Motor Supply Shop, Inc.....Boston
Motor Vehicle Pub. Co.....New York
Moore-Smith Co.....Boston
Moyer, H. A.....Syracuse, N. Y.
Murphy, H. J.....Reading, Mass.
Moline Automobile Co.....E. Moline, Ill.

National Highway Assn.....So. Yarmouth, Mass.
National Motor Vehicle Co.....Indianapolis, Ind.
National Rubber Co.....St. Louis, Mo.
Nettleton, R. B.....Boston
N. E. Hotel Association.....
N. E. Motorcycle Co.....Boston
New England Tel. & Tel. Co.....Boston
New York Coil Co.....New York
Nordyke-Marmon Co.....Indianapolis, Ind.
Norton Grinding Co.....Worcester, Mass.
Norton Co.....Worcester, Mass.

Oakland Motor Co.....Boston
Ohio Electric Car Co.....Toledo, Ohio
Oldsmobile Co., The.....Boston

Packard Motor Car Co.....Detroit, Mich.
Parker Carburetor Co.....Cambridge, Mass.
Parker-Hammerton Mfg. Co.....Boston
Paige-Detroit Motor Car Co.....Detroit, Mich.
Pathfinder Sales Co.....Boston
Paul Mfg. Co.....Boston
Peerless Motor Car Co. of N. E.....Boston
Peerless Motor Specialty Co., Inc.....New York
Pendleton, A. E.....Boston
Perfection Filler Co.....Somerville, Mass.
Pierce-Arrow Motor Car Co., The.....Buffalo, N. Y.
Platt & Washburn Refining Co.....New York
Pope-Hartford Co. of Boston.....Boston
Premier Motor Car Co. of N. E.....Boston
Presto Inter-Rim Co., The.....Boston
Puritan Motor Co.....Boston

Rand, H. L.....Worcester, Mass.
Rauch & Lang Carriage Co.....Cleveland, Ohio
Reed, W. P.....Boston
Regal Motor Car Co.....Detroit, Mich.
Reliance Speedometer Co.....Boston
Renault Freres Selling Branch, Inc.....New York
Reo Motor Car Co.....Lansing, Mich.
R. I. V. Co.....New York
R. & L. Co., The.....Boston
Roberts, Frank L.....Boston
Robinson & Son Co., Wm. C.....Boston
Rockwell, Inc., C. P.....Boston
Rockledge Garage.....Yonkers, N. Y.
Rose, P. R.....Boston
Russell Co., The W. I.....Boston
Rutherford Rubber Co.....Boston

Sage Trunk Co.....Boston
Salman, John A.....Boston
Salt, George E.....Arlington, Mass.
Sawyer Oil Co., Howard B.....Boston
Saxon Motor Car Co.....Detroit, Mich.
Scott & Co., Inc.....Boston
Shaw-Lundin Auto Co.....Boston
Shimpf Starter Co.....Boston
Smith, Fred S.....Boston
Smith Tire Valve Co.....Malden, Mass.
Spedolene Lubricant Co.....Dayton, Ohio
Speedwell Motor Car Co.....Boston
Standard Auto Supply Co.....Boston
Standard Oil Co. of N. Y.....Boston
Standard Woven Fabric Co..So. Framingham, Mass.
Stanley Motor Carriage Co.....Newton, Mass.
Stearns Co., F. B.....Cleveland, Ohio
Stevens Duryea Co.....Chicopee Falls, Mass.
Stevens, W. H.....Boston
Studebaker Corp.....Detroit, Mich.
Stutz Motor Car Co.....Boston
Sutcliffe, C. T. W.....Fall River, Mass.
S. & A. Mfg. Co.....Boston
Sharrer Patent Top Co., Inc.....New York

Texas Co., The.....Boston
Thor Motorcycle Co.....Boston
Tiffany Co., D. C.....Boston
Tobey, William L.....E. Boston
Tolman Mfg. Co.....So. Boston
Treat Hardware Co.....Lawrence, Mass.
Turner, Harrison.....Lawrence, Mass.
Twombly Car Corp.....Avondale, N. J.

Underhay Oil Co.....Boston
Universal Lubricating Co., The.....Cleveland, Ohio
Universal Refining Co.....Boston

Van Dorn Electric Tool Co.....Boston
Varnerin & Paddon.....Roxbury, Mass.
Velie Motor Vehicle Co.....Moline, Ill.
Victor Motor Car Co.....Boston

Walker Lithograph & Pub. Co.....Boston
Waverly Co., The.....Indianapolis, Ind.
Wayne Oil Tank & Pump Co.....Boston
Wentworth-Fosdick Co.....Boston
Westcott Motor Car Co. of Boston.....Boston
White Co., The.....Boston
Whitten-Gilmore Co., The.....Boston
Wilson Co., John V.....Boston
Willys-Overland Co.....Toledo, Ohio
Wing, Frank E.....Boston
Winton Motor Car Co., The.....Boston

Yankee Motor Economy Co., The.....Boston

Zenith Carburetor Co.....Detroit, Mich.
Zetterman Machinery Co., Inc.....Boston

Truck Show March 18 to 21

Abrams Co., Myer.....Cambridge, Mass.
Alma Motor Truck Co.....Detroit, Mich.
American Tire Co.....Holyoke, Mass.
Atterbury Motor Car Co.....Buffalo, N. Y.
Autocar Co.....Boston

Baker Motor Sales Co.....Cambridge, Mass.
Boyd, F. Shirley.....Boston
Buick Motor Co.....Boston

Chase Motor Truck Co.....Syracuse, N. Y.
Chicago Pneumatic Tool Co.....Chicago, Ill.

Eldridge, W. E.....Boston

Federal Motor Truck Co.....Detroit, Mich.
Fischer Co., C. J.....Cambridge, Mass.
Forbes, Walter J.....Boston
Fryer Co., Chas. H.....Providence, R. I.
Fuller, Alvan T.....Boston

Garford Co., The.....Elyria, Ohio
General Motors Truck Co.....Boston

Intern'l Harvester Co. of America.Somerville, Mass.

Jeffery Co., Thomas B.....Kenosha, Wis.

Keating & Decker.....Newton, Mass.
Kinney Mfg. Co.....Boston
Knox Automobile Co.....Boston
Kelly-Springfield Truck Co.....Cambridge, Mass.

Lauth-Juergens Motor Car Co.....Fremont, Ohio
Linscott Motor Co.....Boston
Little Giant Truck Co.....Boston
Locomobile Co. of America.....Boston

Maguire Co., J. W.....Boston
Maddocks, H. Ross.....Boston
Mattapan Motor Car Co.....Mattapan, Mass.
Milliken, E. H.....Boston
Myers Bros.....New York

Packard Motor Car Co.....Detroit, Mich.
Parcel Post Equipment Co.....Cambridge, Mass.
Palmer-Moore Co.....Syracuse, N. Y.
Pierce-Arrow Motor Car Co.....Buffalo, N. Y.

R. & L. Co.....Boston
Reo Motor Car Co.....Lansing, Mich.
Rockwell, Inc., C. P.....Boston

Selden Motor Vehicle Co.....Rochester, N. Y.
Stewart Motor Corp.....Buffalo, N. Y.
Sewell Cushion Wheel Co.....Detroit, Mich.
Spedolene Lubricant Co.....Malden, Mass.
Standard Motor Truck Co.....Detroit, Mich.
Stanley Motor Carriage Co.....Newton, Mass.

Twombly Car Corp.....Avondale, N. J.

Universal Motor Truck Co.....Detroit, Mich.
Velie Motor Vehicle Co.....Cambridge, Mass.
Walter Motor Truck Co.....New York
White Co., The.....Boston
Whitten-Gilmore Co., The.....Boston
Willys-Overland Co.....Toledo, Ohio

Factory Miscellany

FORD'S Portland Plant Opened—The new assembling plant of the Ford Motor Co., located at East Eleventh and Division streets, Portland, Ore., was opened during the past week. This new plant represents an investment of more than $200,000 to Portland, and is employing about 150 men, the plant going into full operation on March 1. The building occupies three floors and basement and contains 90,000 square feet of floor space. It is of concrete and brick. The floors are of heavy concrete construction, designed to carry great weight. There are four of these Ford plants on the Pacific Coast, one at Los Angeles, one at San Francisco, one at Seattle and one at Portland. They were built to assemble cars in units of 700. The outlook is so good, however, in Oregon that the Portland plant will house just double the number of parts, or 1,400.

Mecy Co. Will Enlarge—The A. Mecy Co., Philadelphia, Pa., manufacturing automobiles, will build an addition to its shop.

Poyer to Increase—The D. F. Poyer Co., Menominee, Mich., manufacturer of motor trucks, plans to increase its manufacturing facilities.

Automobile Rim Co. Enlarges—The Mahannah Lumber Co., Memphis, Tenn., is planning to enlarge its bending mills. It manufactures automobile rims.

Beaver Buys Tract—The Beaver State Motor Co., Portland, Ore., has purchased a six-acre tract in Gresham and will erect a plant for the manufacture of automobiles.

Hans Equipment Doubles Capacity—The Hans Motor Equipment Co., La Crosse, Wis., manufacturing pumps and gauges for automobiles, intends to take occupancy of its new works about March 15 and will then double its capacity. Its present quarters, the old plant of the defunct Vote-Berger Co., electrical equipment, has been placed on the market by the trustee.

Gadabout Factory in Newark—The Gadabout Motor Corp. has secured the Dixon Cascade Pump Co.'s factory at Badger avenue and Runyon street, Newark, N. J. The factory has a floor space sufficient to allow the company a daily output of fifty cars. This company started the building of this cyclecar a little over a year ago. It will have offices at 29 Broadway, New York City.

La Vigne to Begin Active Work—Arrangements are being rapidly completed by the La Vigne Cyclecar Co., Detroit, Mich., to start active manufacturing and announcement of the location of its main factory will be made within a short time. The company had leased two floors of the plant now occupied by the La Vigne Mfg. Co., where some of the building operations will be carried on.

Appleton Plant Addition—The Tire Repair Equipment Co., Appleton, Wis., has purchased the stock, machinery, patents and business of the Meili-Blumberg Co., New Holstein, Wis., manufacturing attached sliding hinge clamp vulcanizers. The Appleton company will continue the manufacture of this device under the trade name of Badger steam vulcanizer. The Appleton plant will be enlarged at once.

Columbia Cyclecar Output 400—With the completion of its two-story brick building in Twelfth avenue, between Union and Pike streets, Seattle, Wash., the American Cyclecar Co. is making plans for the inauguration of manufacturing operations. It will manufacture a two-cylinder two-passenger vehicle to be known as the Columbia. The first year's output will be about 400 cars, and it is expected that actual manufacture will begin by March 15.

$1,000,000 Dominion Tire Plant—The $1,000,000 plant of the Dominion Tire Co., Berlin, Ont., has been opened. The plant is at present employing over 300 hands, and in two more weeks this number will be increased to 400. At present 150 tires are being turned out daily, but the plant has a capacity of 500 tires daily. The employees are now working thirteen hours per day in order to catch up with the orders for this year. The entire output for 1914 has been placed.

Cincinnati Rubber Will Add—Extensive additions to the plant of the Cincinnati Rubber Mfg. Co., Cincinnati, O., to take care of the growing business of the concern will soon be built. The need for an enlarged plant was the principal subject of discussion at the annual meeting of the company held recently. Last year was reported to have been the most prosperous in the history of the company and a large sum was added to the surplus fund.

Hagstrom Co. Sold—The Hagstrom Mfg. Co., Salina, Kan., manufacturer of electrical, rubber and hardware specialties, has been sold to the following parties: J. F. Merrill, president; Charles Lander, production manager, and R. J. Laubengayer, sales manager. This new company, which keeps its former name, has added to its regular line of blowout patches a new patch called the Hagstrom Swede. The sales office will be located at Salina, but the factory will continue at Lindsborg.

The Automobile Calendar—Shows, Meetings, Etc.

March 2-7.....Sioux City, Ia., Show, New Auditorium Bldg., Sioux City Auto Club Assn.
March 2-7.....Utica, N. Y., Show, Automobile Club, W. G. Comstock, Manager.
March 3-7.....Fort Dodge, Ia., Show, Fort Dodge Auto Dealers' Assn.
March 3-7.....Tiffin, O., Show, *Tiffin Advertiser.*
March 5-6.....New York City, National Automobile Chamber of Commerce. Monthly and Yearly Meetings.
March 5-6.....Cedar Rapids, Iowa, Automobile Show, Cedar Rapids Independent Auto Dealers' Assn.
March 7-14.....Hamilton, Ont., Passenger and Truck Show.
March 7-14.....Boston, Mass., Automobile Show.
March 9-14.....Des Moines, Ia., Show, Des Moines Automobile Dealers' Assn.
March 10.....New York City, S. A. E. Iron and Steel Division Meeting.
March 17.....New York City, S. A. E., Springs Division Meeting.
March 17-21.....Boston, Mass., Truck Show.
March 18-22.....Sharon, Pa., Auto Show.
March 21-28.....St. John, B. C., Show, Armory, New Brunswick Auto Assn.
March 24.....New York City, S. A. E. Broaches Division Meeting.
March 31.....New York City, S. A. E., Electric Vehicle Division Meeting.
April 7, 8, 9.....New York City, S. A. E. Standards Committee Meeting.
April 9-15.....Manchester, N. H., Automobile Show.
April 12-19.....Prague, Austria, Eleventh Annual International Auto Exhibition, Royal Tiergarten.
April 21.....New York City, S. A. E., Research Division Meeting.
May 5.....New York City, S. A. E. Electrical Equipment Division Meeting.
May 12.....New York City, S. A. E. Ball and Roller Bearings Division Meeting.
May 14.....New York City, S. A. E. Motor Testing Division Meeting.
May 25-26.....Palermo, Sicily, Targa Florio, 700-Mile Race.
May 30.....Indianapolis, Ind., 500 - mile Race, Indianapolis Motor Speedway.
June 1.....Palermo, Sicily, Coupé Florio 279 Mile Race.
June 23-26.....S. A. E. Summer Meeting, Cape May, N. J., Cape May Hotel.
June 24-26.....Chicago, Ill., Seventh Annual Meeting of Nat. Gas Engine Assn.
July 3-4.....Tacoma, Wash., Road Races, Tacoma Carnival Assn.
July 4.....Sioux City, Iowa, 300-mile Race, Sioux City Auto Club and Speedway Assn.
July 4.....Lyons, France, French Grand Prix.
July 13-14.....Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26.....Belgium Grand Prix Road Races.
Aug. 28-29.....Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Sept. 9.....Corona, Cal., Road Race, Corona Auto Assn.
Sept. 26-Oct. 6.....Berlin, Germany, Automobile Show.
Oct. 1.....Paris, France, Kerosene Motor Competition.
Oct. 19-26.....Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
November .....El Paso, Tex., Phoenix Road Race, El Paso Auto Club.

The Week in the Industry

Motor Men in New Roles

WILLIS Elected Vice-President—At the annual election of the Indianapolis Chamber of Commerce, Indianapolis, Ind., F. I. Willis was elected first vice-president. He is a member of the Hearsey-Willis Co., distributor of the Hupmobile and dealer in accessories and sundries.

Croninger Manager Apple Plant—H. R. Croninger has been made factory manager of the Apple Electric plant at Dayton, O.

Campbell Miller Advertising Manager—W. S. Campbell has been appointed advertising manager of the Miller Rubber Co., Akron, O.

Hood Succeeds Wilcox—W. C. Hood has been appointed sales manager of the Standard Motor Truck Co., Detroit, Mich. He succeeds G. D. Wilcox.

Sawin Metz Sales Manager—W. J. Sawin has been promoted from the sales ranks of the Northwest branch of the Metz Co. to the position of sales manager.

Galvin Remy's Frisco Manager—H. J. Galvin has been appointed manager of the San Francisco, Cal., branch of the Remy Electric Co., Anderson, Ind., upon the retirement of P. E. Kempton.

Peterson Manager Lee Tire Agency—A. M. Peterson has been placed in charge of the tire department for Chanclor & Lyon, Seattle, Wash., and will have supervision of the Lee tire business in Washington and Idaho.

Berger Selling Muir Carbureters—F. H. Berger, formerly chief engineer of the Oakland M. C. Co., has opened a sales office in Detroit, Mich., where he will sell the Muir carbureter, made by the Muir Carbureter Co., Baltimore, Md.

Cain Resigns from McCord—J. W. Cain, for the past year chief engineer of the McCord Mfg. Co., Detroit, Mich., has left this company to engage in the railway supply business in Houston, Tex. Howard Greer, Jr., has succeeded him.

Cordner Voiturette Branch Manager—E. Q. Cordner has become the branch manager of the American Voiturette Co., Detroit, Mich., in charge of the Chicago, Ill., branch. This company manufactures Keeton and Car-Nation cars.

Tucker Stromberg Manager—Fred E. Tucker has joined the Stromberg organization in New York City. He was first with the Pope-Hartford and later with the Hold-Chandler Co. in that city, and most recently has been traveling for the Maxwell Motor Co.

Reid Joins Anderson—T. C. Reid, formerly sales manager for the Grinnell Electric Co., Detroit, Mich., has resigned his position to join the staff of the Anderson Electric Car Co., that city, maker of the Detroit electric. His headquarters will be at 687 Woodward avenue.

DeLand Promoted—L. S. DeLand, for two years special factory representative of the Studebaker Corp., in Wisconsin, has been appointed general sales manager of the Wolleager Sales Co., Milwaukee, Wis., state agent for the Studebaker. He will be in charge of both wholesale and retail sales.

Smith Edison Assistant Manager—Bertram Smith, who started in the storage battery business in 1899 with the old National Battery Co., Buffalo, N. Y., has been appointed assistant manager of the Edison Storage Battery Supply Co., San Francisco, Cal., which handles the Edison battery.

Kennard in New Capacity—T. B. Kennard, formerly manager of the Swinehart tire branch in Cleveland, O., is associated with the Miller Tire Co., distributing branch, the City Auto Tire & Supply Co. Mr. Kennard will be the factory representative through the northeastern part of the state.

MacAnaney Republic's Cleveland Manager—L. L. MacAnaney has been made manager of the Cleveland, O., branch of the Republic Rubber Co. He was identified with the Goodrich company for 7 years as the local branch manager and on consolidation of the Goodrich and Diamond branches was made manager over the combined houses.

Garage and Dealers' Field

BUS Lines for Queens—The Hillside Transportation Co. recently began operations in Queens, N. Y., to operate a line of buses for a distance of ten miles on the south side of the borough. The company intends to apply for an extension of the franchise to cover a territory of seventy miles. The buses will be of the type used on the Fifth avenue, New York City, line. Three routes have already been established. One extends from the Morris Park station of the Long Island Railroad to the Kew station of the same road and furnishes transportation to Forest Park. Another route extends from the Jamaica station to the Long Island Railroad through Hillside avenue and the section to the north to the Hollis station of the Long Island Railroad. The other route extends from the County Clerk's office and the Town Hall at Jamaica to Broadway, Flushing.

Into Larger Quarters—The Radiator-Fix Co., of Boston, Mass., has outgrown its old quarters and has moved into larger ones at 121 Massachusetts avenue.

Dunlop Opens Saskatoon Branch—The Dunlop Tire and Rubber Co. has opened a branch in Saskatoon, Canada, under the management of G. H. Clotworthy.

Installs Charging Plant—R. H. Sherwood, manager of the American Garage, Painesville, O., has installed a charging plant. It is the only plant between Cleveland and Erie.

Marathon Tires Represented—The Marathon Tire Co. is now represented in New England with headquarters in Boston, Mass., the Dayton Tire Co. of that city having added the Marathon to its line.

New Service Station—The E-Z Rim Co., Boston, Mass., has opened a new service station for the convenience of customers at 98 Massachusetts avenue. B. A. Crockett, formerly identified with several agencies, is manager of the new company.

Stewart Moves—The Stewart Automobile Co., New York City, distributer of the Pullman automobiles, will move from its present home in Fifty-fourth street to the Diamond Tire Bldg., at Fifty-seventh street and Broadway, on March 10.

Hood Tire Agency Placed—The agency for Missouri, Kansas and Oklahoma for the Hood tires, made by the Hood Tire Co., Watertown, Mass., has been placed with the Rubber Tire Repair Co., 915 East Fifteenth street, Kansas City, Mo. The manager is H. A. Winters.

White's Large Truck Shipment—A train 700 feet long, made up of nineteen box cars, left the White Co.'s plant, Cleveland, O., recently, bound for Pittsburgh, Pa., with a consignment of thirty-eight trucks. This is said to be the largest single shipment of trucks.

St. Louis Company Helps Pay for Car—Buyers of automobiles in St. Louis, Mo., in the future who do not happen to have all the cash necessary can have the Davis-Goodloe Co. pay the balance. The company expects to make loans to prospective automobile buyers, taking a chattel mortgage on the automobile as security and charging the owners but a small rate of interest.

Franklin's New Print Shop—The Franklin Automobile Co., Syracuse, N. Y., has published a new catalog called the Franklin Six-Thirty. This is the first big catalog that this company has attempted to get out in its own print shop. This shop not only takes care of all factory forms, letterheads, etc., but is now doing all advertising literature, parts price lists, instruction books, etc.

Moline-Knight Quarters—Harrison Turner, who took the Moline Knight for Boston, Mass., during the New York show has opened temporary quarters at 889 Boylston street in the former salesrooms of the Studebaker Co. and he has placed Percy I. Reynolds, of Lynn, Mass., in charge of the sales. Later on permanent quarters will be opened in the new Barrison building on Commonwealth avenue.

Another Goodrich Book Published—Volume II., "Motor Trucks of America," has been published by the B. F. Goodrich Co., Akron, O. The aim of the book is to supply prospective buyers needed data about motor transportation that will enable them to select exactly the right truck for their particular service. The first announcement of this book brought so many requests that the company was compelled to issue a second volume.

Powerful
Quick Acting Brakes
and Perfect Control Over the Car

come from the use of

MULTIBESTOS

The Brake Lining of Quality

Brakes lined with **Multibestos**
are a guarantee of safety
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SALES BRANCHES

New York, 276 Canal St., C. D. Schmidt.
Boston, 903 Boylston St., F. Shirley Boyd.
Philadelphia, 1427 Vine St., N. A. Petry Co. Chicago, 1430 Michigan Blvd., F. E. Sparks. San Francisco, Fred Ward & Son.

MULTIBESTOS

Accessories for the Automobilist

SMITH Easy Pumping Tire Valve—A valve that greatly reduces the effort necessary to pump up a tire has been put forth by the Smith Tire Valve Co., 9 Doane street, Boston, Mass. It is well known that in the ordinary tire valve a great deal of pressure is required to cause the valve to open, and that the power expended in producing this pressure is entirely wasted. The Smith valve, a vertical section of which is shown in Fig. 1, has been designed to remedy this difficulty. As indicated in this figure the seat of the valve is made of brass and the valve itself of rubber. It will be noted that the seat has a rather sharp edge so that very little pressure is required between the valve and the seat in order to hold the pressure in the tire. This is the feature that enables this valve to be opened with much less pumping effort than the other type, and for this reason a very light spring is used to hold the valve in place. This valve is simply attached by screwing it on to the end of the present valve stem of the tube, but before doing this it is necessary, of course, to remove the old type valve. One advantage of having this valve detachable is that when a tube wears out the valve may be removed and put on a new tube. It is stated that with the old type of valve as much as 40 pounds is sometimes required to open it, while the pressure required to open this new valve is negligible. The price of these valves is $2 per set of five.

Quixet Rapid Wrench—The S. & A. Mfg. Co., Boston, Mass., has recently brought out a monkey wrench, Fig. 2, that is instantly adjustable to any size nut by simply pushing the movable jaw. This jaw is held by small saw teeth on its lower end that mesh with similar teeth on the wrench handle. Contact between the teeth is secured by a spring on the back of the wrench and by pressing this spring the teeth are moved out of engagement so that the jaw can be slid backward. Forward movement is obtained by merely pushing the jaw. Five and 8-inch wrenches are made and these sell for 35 or 50 cents to 60 or 75 cents, depending on whether the finish is mottled or nickeled.

Ajax Rear Tire Trunk—Several accessory novelties have been brought out by the Ajax Trunk & Sample Case Co., New York City. One, Fig. 3, is an all wood tire trunk with provision for carrying the number plate and rear light. Around the outside of the trunk there is room enough for three extra casings. The door to the inside is pivoted at the center and is opened by rotating to the left. The license number is screwed to the panel below the door and the tail lamp is attached at one side.

Another type of trunk is the fender trunk, which is intended for touring and is designed to fit snugly to one of the forward fenders. Provision is made for three suitcases and a hat box.

Western Electric Chau-Phone—A new instrument, Fig. 4, recently brought out by the Western Electric Co., New York City, is a limousine telephone, consisting of a hand transmitter for the passenger and a loud-speaking receiver for the chauffeur, designed to operate on an ordinary 6 or 8-volt circuit. It is asserted that orders given in an ordinary conversational tone are delivered, with the volume greatly magnified by the megaphone shaped receiver, loud and clear above wind and street noises. The disadvantage of the speaking tube as compared with the Chau-Phone is that the impact of the air against the flaring receiver is sufficient to blow the sound back into the tube, muffling it so that in many cases it is lost. The transmitter is neatly finished in black, and when not in use is carried in a pocket in the upholstery.

Western Electric Lock-All Switch—An interesting switch, Fig. 5, that is designed to be mounted flush with the dash and through which all electrical circuits can be controlled, is made by the Western Electric Co., New York City. A special feature is the Yale lock, by which the several buttons controlling the various circuits can be locked in position. The advantage of this is that when the car is left alone the ignition and horn circuits can be broken and there is no danger of any one stealing the car or operating the horn. At night, side and tail lights can be lit with no fear that anyone will come along and either turn them off or switch on the headlights. A large central knob that can be operated with the foot instantly directs the current from the head to the side lights, or vice-versa, thus enabling the motorist to readily switch off the powerful headlights when passing another car. The switch is handsomely finished in nickel and sells for $12.

Goodyear Standard Tire Protector—The Standard tire protector which has recently been taken over by the Goodyear Tire & Rubber Co., Akron, O., is designed to protect the casings of both old and new tires. It consists of an extra casing that goes over the ordinary shoe and is held in place simply by the inflation of the tire. On a new tire this protector will insure it against trouble from stone bruises or cuts and will increase its life greatly, while on an old shoe the protector practically takes the place of a re-tread, but it has an advantage over the re-tread in that should the shoe give away before the protector is worn out the protector may be quickly removed and used on another old shoe. The Standard tire protector is not quite round, having an angle at each side of the tread, and this is for the purpose of providing air chambers to prevent injury to the tire from overheating or jarring. The protector is easily attached by deflating the tire and removing it from the wheel. The tire is then set into the bottom of

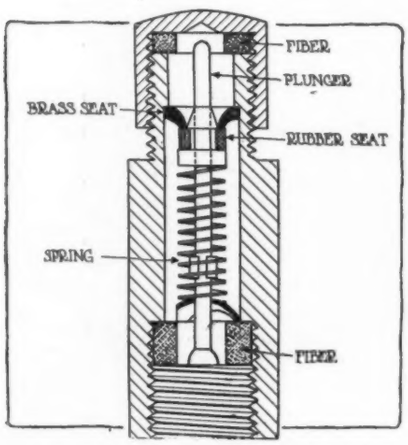

Fig. 1—Smith easy pumping tire valve

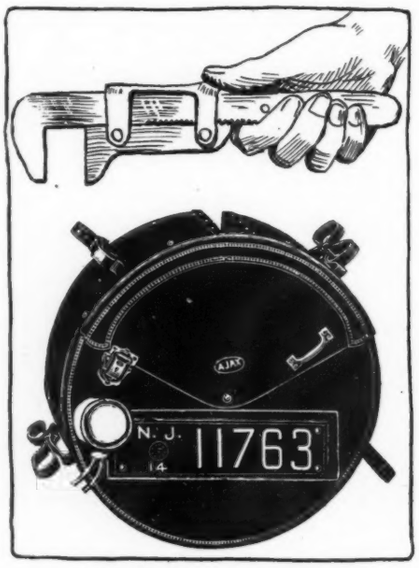

Fig. 2—Quixet rapid wrench
Fig. 3—Ajax rear tire trunk

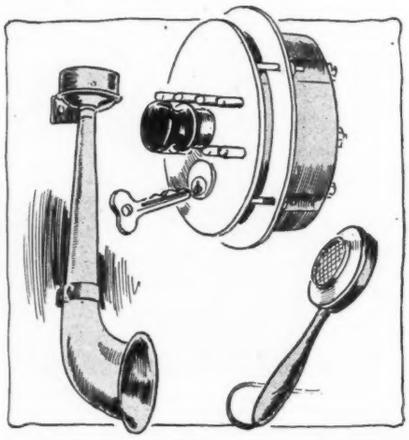

Fig. 4—Bottom, Western electric Chau-Phone
Fig. 5—Top, Western electric Lock-All switch

Ride On Something Substantial

THE DAYTON AIRLESS TIRE

America's Standard High Grade Tire Equipment

Our users have written a booklet for us
We have printed it
Send for it
Get the real facts
Then you will be able to sell them to yourself

Very satisfactory for touring cars
Many thousands now running on Ford cars
Economical on heavy Limousines
Superfine for Electrics
Only thing for Delivery Cars
Saves vibration on light trucks
Adopted as standard on fire apparatus

An idea—Buy one for a spare—It will sell the other three to you after you come to use it.

The Dayton Rubber Manufacturing Company

1003 Kiser Street, Dayton, Ohio

1874 Broadway
New York

2123 Michigan Avenue
Chicago

Some Dealers' Territory Still Open

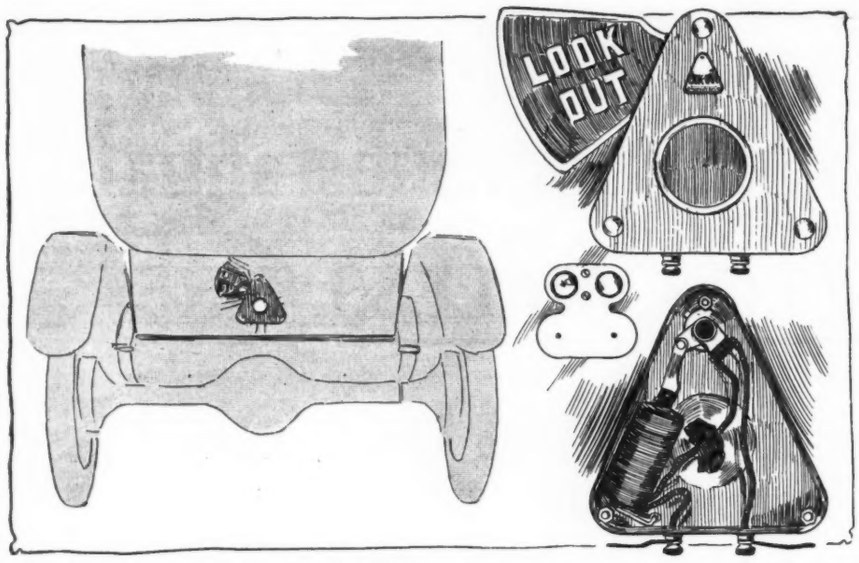

Fig. 6—Look-out rear signal: Left—Attached to the car. Top, right—Semaphore raised. Bottom, right—Signal with cover removed

the protector and the protector is slipped over the shoe. When the tire is put back on and inflated, the protector will be held tightly in place. The Standard tire protectors are made with an anti-skid tread in sizes ranging from 33 x 4 to 37 x 5. The corresponding prices vary from $18.75 to $26.60, and the weights from 14 pounds to 15 pounds 2 ounces.

Lookout Rear Signal—An interesting signalling device that is designed to warn the drivers of cars in the rear, when a turn or stop is about to be made, has been introduced by the Baer Manufacturing Co., 1719 No. 33d street, Philadelphia, Pa. The illustration of this signal, Fig. 6, shows that it is a neat and attractive design and very simply constructed. The signal consists of two parts; there is a semaphore with the words "Look Out" on it which waves slowly to attract the attention of the drivers in the rear and at night a purple light flashes. The semaphore is painted red and when not in use is automatically locked in place and therefore cannot rattle or wear loose. The semaphore is operated by a solenoid coil, this mechanism also switching on the light. This signal is designed to be operated from an ordinary 6-volt circuit through a switch on the steering wheel. The switch is of a special interest because adjacent to the push button there is a small electric light that flashes whenever the signal operates, and thus it indicates whether the mechanism is working properly. The signal retails at $10.

Stewart Auto Thermo-Meter—The most recent addition to the line of products manufactured by the Stewart-Warner Speedometer Corporation is a thermometer, Fig. 7, for indicating the temperature of the cooling water. The Auto Thermo-Meter, as it is called, is attached by drilling a hole in the radiator filler cap and is featured by the use of a hand to indicate temperatures instead of using a colored liquid in an inclosed tube. The advantage of the hand is that it is easier to read, the Stewart company claiming that with this pointer, which is two inches long and which operates on a curved dial nearly 3 inches in length, it is possible to read the instrument from the tonneau without the slightest difficulty. The price of this instrument, finished in either nickel or brass, is $10.

Ellis Steel Cushion Tire—A new type of cushion tire, Fig. 8, has been brought forward by the Steel Cushion Tire Co., Marbridge Bldg., New York City, for which many novel features are claimed. One of the strongest points in its construction is that the driving strain is not transmitted through the cushion springs but through fixed stops. This is clearly illustrated in Fig. 9. It is said that more traction is developed owing to the fact that the tread can be made any desired width and that steering is rendered easier as the contact with the ground is a curved line while in the ordinary pneumatic the line of contact is flat for some distance. Lubrication is not absolutely necessary although it is somewhat beneficial. It has been found, contrary to expectations, that dirt and dust will not collect inside the tire, due to centrifugal force. A non-skid rubber tread is used on the tire surface.

J-M Fyro—A handy fire extinguisher has been added to the line of products manufactured by the H. W. Johns-Manville Co., New York City. This extinguisher discharges a liquefied gas which is held under great pressure and which is said to be forty times as effective as water. It is simply operated by holding it in an upright position and then turning a small valve about the size of a silver dollar. The advantages claimed for it are that no mechanical force is required to operate it, nor is it necessary to turn it upside down as is often the case with fire extinguishers of this character.

In many extinguishers the stream has such force that it is often shot through the flames, a large part of it going to waste, and for this reason the J.-M.-Fyro is provided with an adjustment so that either a spray or a stream can be obtained. The spray can be thrown 10 feet and the stream 25. The spray is most effective on small fires scattered over a comparatively large area, while the stream is preferable for fires concentrated in one spot. The liquid gas used in this extinguisher puts out the fire by enveloping it in a blanket of dense gas that will not support combustion.

As the extinguishing fluid contains no moisture it is a non-conductor of electricity and therefore can be used without fear of short-circuits, and as it is a gas and not a liquid it can be used to put out gasoline fires without fear of spreading the burning gasoline. Another feature is that this fluid will not injure delicate fabrics or furnishings and is non-corrosive.

Gibson Portable Welding Outfit—A new accessory has been added to the line of Gibson Quality Products in the shape of a portable oxygen acetylene welding and carbon removing outfit. This equipment is carried in a hand case, weighing less than 40 pounds, and is used in connection with standard tanks of compressed oxygen and acetylene. It will weld all kinds of metal and it is stated that little skill is required to operate it satisfactorily. It also has a decarbonizing attachment which can be used in removing incrusted carbon from the motor cylinders. When this is done, only the oxygen tank is required. This outfit is made by the Gibson Automobile Co., Indianapolis, Ind.

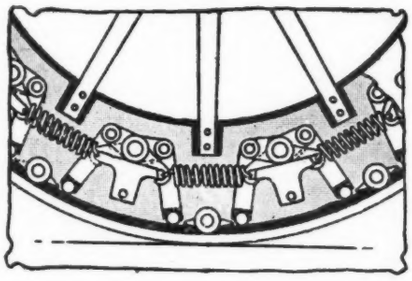

Fig. 9—Ellis cushion tire, showing the arrangement of the springs

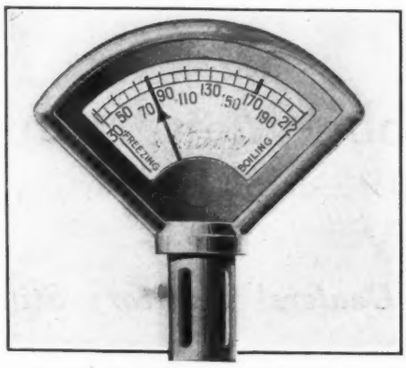

Fig. 7—Stewart auto thermo-meter

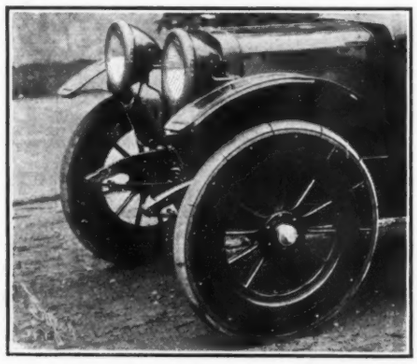

Fig. 8—Ellis cushion tire on a car